



# SURGICAL EPITOME

BY

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# Dedicated

TO

MY DEAR FATHER

MR. VITHALRAO S NADKARNI

Without whose selfless sacrifice I could never have  
been whatever I am.

*"A real hero is seen more often in everyday life than on a battle-field, in everyday quiet sacrificial sufferances than in temporary homicidal frenzy, on the losing than on the winning side, in darkness and obscurity than in sunshine and limelight. Look around with open eyes and if you are fortunate enough, you will see one quite near you."*





## FOREWORD

It must be a matter of pardonable pride for a teacher to be requested to write a foreword to a book by one of his pupils. In the present instance it is also a pleasure to do so as the teacher realises that his student has been more industrious than himself.

Surgery cannot be learnt from text-books. It can only be learnt in the Out patients Department and the wards of a hospital, under the guidance of a good teacher. A good clinical teacher alone can impress upon the student the value of accurate observations and the importance of a correct approach to a Surgical problem.

However, the time allotted to the teaching of Surgery in the University curriculum is hardly sufficient to enable the student to attain real proficiency in the subject. The present curriculum in Medicine as designed by the different Indian Universities is so overloaded, that it is safe to conclude that it is intended for super students. The average student is nightly haunted by the spectre of the approaching examination. He has no other alternative but to obtain the requisite knowledge from books. The ground that he has to cover in his readings is truly extensive. Unless the student has acquired the art of making his own notes, he will find it difficult to "brush up" the different subjects just before his examination.

It is at this juncture that Dr. Nadkarni's book will be found to be truly serviceable. As explained by the author in his very lucid preface this book is an Epitome of Surgery. It is not intended to replace any of the good text books in Surgery. "Surgical Epitome" will provide the means for a very rapid revision of this vast subject.

This book will also prove useful to a lecturer in Surgery in bringing before him, in a condensed form, the various points he would like to dilate upon.

I wish this publication all success.



## PREFACE

Success depends, not on the possession of knowledge—however vast it may be—but on its ready presentation at the required moment, the ready presentation of the knowledge requires excellent memory which, in its turn, is the outcome of repeated revisions. Repeated revisions of a subject,—especially of a vast subject like surgery—are possible only with its concised epitome. General reading of a vast subject is comparable to wandering in a dense jungle exploring its depth, without leaving any marks for the return journey and thus losing one's way, while revisions of an epitome of the subject are just like a provision of landmarks for a path for safe return journey \*

The author knows many a brilliant student whose main cause of failure was too much and too vast a reading, which naturally was beyond the capacity of digestion. Brain is a limited reservoir and after a certain limit, every fact impressed upon it, is at the cost of some other—perhaps more important—fact, which is effaced. So the brain should not be overcrowded with irrelevant and unnecessary facts lest important material may be lost in unnecessary details. The present epitome can be compared to a review from an adjoining hillock, of a big city strewn with familiar landmarks, which helps in giving a general idea of its whole geography

The author attributes his humble success in academical and professional spheres to revisions—repeated revisions—of his subject. While he was a teacher of surgery in medical institutions at Bombay and Poona, he had made up his mind to guide his students along this principle, and the present book is the outcome of all the personal notes he had made for his examinations and teaching.

Due to vastness of the subject, the author has arranged the subject matter in two volumes. The whole subject has been divided into four parts (1) Tissue Surgery—surgery of anatomical structures (2) Regional Surgery—surgery of the

different anatomical regions of the body, (3) Systemic Surgery—surgery of the different physiological systems of the body and (4) Some General States—general surgical conditions. Every section has been divided into well-known pathological heads —(1) Congenital abnormalities, (2) Trauma (3) Infections, (4) Specific diseases, (5) New Growths, and two additional practical heads (6) Operations and (7) Important points the last head is the special feature of the book, these points being collected from a vast amount of literature and personal experience. Every disease has been treated exhaustively under various sub-heads: Definition, Anatomy Physiology Pathology with Morbid anatomy Clinical syndrome, Complications Prognosis, Treatment—conservative and operative, including pre-operative treatment, anaesthesia individual steps of the operation, post-operative treatment, post-operative complications with their treatment, etc., so that the book may be useful not only from the theoretical but also from the practical point of view. The author is sure that the book will prove as much useful before and after any operation, to a practical surgeon, as to a student or a post-graduate before an examination. The author has tried to be as exhaustive as possible without losing any ground to unnecessary details, but regrets that owing to deplorable shortage of paper he had to cut down some material on elementary surgery and Gynaecological surgery which he hopes to add in future editions.

In order to have clear and ineffaceable impressions on the brain the usual running style of printing has been discarded and the subject matter has been arranged in an elaborate style at the cost of much labour and increase in the number of pages at a time when not only the paper is exorbitantly expensive but is scarcely available in the market.

The book is made useful to the practitioner of surgery and any medical student Diploma, Graduate and Post-graduate—right from L.M.P. to M.S. and F.R.C.S.—by the use of different types, the basic material being printed in thick type important material in italics, and the post-graduate details

in small type, the standard type being used for standard knowledge

Although a General always gets into the limelight for a success in a battle every one knows and appreciates the part of his colleagues and followers without whose loyal co-operation, he would be nowhere. In fact, the General is only the emblem of the whole brigade whose sacrificial work has brought in the success.

I seriously doubt whether the book could have seen the light of the day if I had been less fortunate in my printers, whose unfailingly courteous and sympathetic patience—bordering on indulgence—and excellent devotion to the work in hand, are the subject of my unabating admiration, which has only increased with time and difficulties. I have really no words to thank them enough.

I express my heart felt gratitude to my friend Mr R. G. Glade M.S. Hon. Asst. Surgeon, K.E.M. Hospital, Bombay who at the cost of his valuable time, has gone through the bulk of 3 000 pages of manuscript. In fact, but for his kind and willing help it would have been nearly impossible for me to finish the work in time.

I am also indebted to my sister Miss Kusum Nadkarni, and my brother M. V. Nadkarni, B.Sc., for their zealous and intelligent help in the tedious work of compiling the index.

I also owe much to my departed mother and my dear wife, whose constant encouragement and pride in my work, have been my only solace during the dark moments of my life.

I consider this to be a fit occasion to pay my homage to my revered Gurus, Late Dr R. D. Shirwalkar M.S. (Lon.), F.R.C.S. (Eng.) and Dr R. N. Cooper, M.S. (Lon.) F.R.C.S. (Eng.), and to my mother institutions, Grant Medical College and K.E.M. Hospital of Bombay and Sassoon Hospitals of Poona.

I cannot close this preface without acknowledging my debt of gratitude to all my friends and well-wishers who contributed to the success of my 'Foreign Education Five Rupee

Loan Scheme' some years back, which helped me to get the foreign qualifications, and gave me an opportunity of studying surgery in England and Vienna. I am sure that they will be proud to know of this outcome of their contributions and will feel that their trust, at the time was not misplaced.

Last, but of course not the least, I thank the authors of all the English, American and Continental Surgical books, Monographs and Journals, to which I have made free references.

The very fact that the present work was in embryo for the last five years and in print for the last two years, will give an idea of the amount of work and toil behind it. But that is not all. The book and its author have been passing through an acute crisis in life and it is a matter of great satisfaction and pride for the author and his helpers to see that the work is seeing the light of the day inspite of heavy odds against them. The author fully apprehends the result of this hazardous venture taken up by him in these hard days, but sincerely thinks himself to be fully repaid if the work proves to be a benefit to a student and a follower of his dear subject.

POONA,  
25th March 1944.

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**PART I**

**TISSUE SURGERY**



## CHAPTER I

# SKIN AND SUBCUTANEOUS TISSUES

## I TRAUMA OF THE SKIN AND SUBCUTANEOUS TISSUES

### (A) SUBCUTANEOUS INJURIES :

#### (1) CONTUSION

Def	Diffuse hæmorrhagic infiltration of the subcutaneous tissues		
Etio	Impact against blunt hard object		
Path	Rupture of subcutaneous capillaries with extravasation of blood in the tissues		
Clinic	Painful oedematous discoloration with play of colours		
Sites	(a)	Local	
	(b)	Gravitational	
Compl	(a)	Sepsis	
	(b)	Sloughing	
Treat	(1)	Early	(a) cold and evaporating lotions
			(b) elastic pressure
			(c) rest in splint
	(2)	Late	(a) heat
			(b) massage

#### (2) HÆMATOMA

Def	Circumscribed collection of blood		
Etio	(a)	Traumatic	
		(1)	open
		(2)	closed
	(b)	Post-operative	
	(c)	Pathological	
		(1)	Secondary hæmorrhage
		(2)	Blood conditions    scurvy, purpura, hæmophilæ
Path	(a)	Immediate	
	(b)	Intermediate    reactionary hæmorrhage	
	(c)	Delayed    secondary hæmorrhage	
Clinic	(1)	History of injury	
	(2)	Superficial signs of injury	
	(3)	Local mass	
		(a)	fluid
		↓	
		(b)	firm
		↓	
		(c)	hard

- (4) **Pressure signs** on  
 (a) nerves  
 (b) vessels
- Diff. diag (1) Depressed fracture skull vault  
 (2) Fracture skull base orbital hæmorrhage  
 (3) Abscess  
 (4) Inflamed aneurysm
- Compl (1) **Sepsis**  
 (a) suppuration  
 (b) secondary hæmorrhage  
 (c) anaerobic infections
- (2) **Pressure effects**  
 (a) distal gangrene  
 (b) ischæmic contractures
- (3) **Fibrosis**  
 (a) persistent mass  
 (b) contractures and adhesions  
 (c) nerve implication
- Treat (1) **Prophylactic**  
 (a) preliminary coagulants  
 (b) good hæmostats  
 (c) obliteration of dead spaces  
 (d) prophylactic drainage  
 (e) tight bandage and elevation  
 (f) avoidance of stimulants
- (2) **Conservative**  
 (a) early rest and cold applications  
 (b) late heat massage, Pot. Iodide
- (3) **Operative**  
 Ind (a) pressure effects  
 (b) sepsis  
 Tech incision  
 ↓  
 evacuation  
 ↓  
 closure (a) without drain  
 (b) with drain

## (B) OPEN WOUNDS

- Path-Varieties (1) **Incised wound**  
 Etio (a) sharp instrument  
 (b) blunt instrument against skull
- (2) **Stab wound** incised wound by a narrow long instrument with depth out of all proportion to superficial length
- Compl injuries to viscera

- (3) **Punctured wound**  
 Etio needles, nails, thorns  
 Compl (a) sepsis  
     (α) pyogenic  
     (β) anaerobic  
         (1) local abscess  
         (2) regional lymphadenitis  
             cellulitis  
         (3) general septicæmia  
     (b) retention of foreign bodies
- (4) **Gunshot wound**  
 Clinic (a) portal of entry  
     (b) portal of exit present or absent  
     (c) trauma to viscera  
     (d) X Ray
- (5) **Lacerated wound**  
 Etio Dragging or tearing  
 Path Laceration of skin subcutaneous  
     tissues, muscles, tendons, vessels  
     and nerves  
     Superficial extension more than depth  
 Compl (a) Sepsis (α) pyogenic  
     (β) anaerobic  
     (b) Fibrosis
- (5a) **Abrasion**  
 Def Laceration affecting only the skin or  
     mucous membrane
- (6) **Contused wound**  
 Etio Impact against blunt objects  
 Path Contusion of margins and surround  
     ing tissues  
 Compl Sepsis
- (7) **Friction wounds**  
 Etio Rub against a rough surface  
 Path Superficial abrasions and lacerations  
 Clinic Burning pain  
 Treat Soothing non-irritating emollients
- (8) **Fissured wounds**  
 Etio Over distension  
     Over extension

- Complications (1) **Sepsis**  
     (a) **Local**  
         (α) sloughing  
         (β) abscess  
     (b) **Regional**  
         (α) cellulitis  
         (β) gangrene

- (c) **General**
  - ( $\alpha$ ) toxæmia
  - ( $\beta$ ) septicæmia
  - ( $\gamma$ ) pyæmia
- (d) **Special** Anaerobic infection
- (2) **Fibrosis**: deformity contractures
  - adhesions
  - stretching
  - keloid
  - ventral hernia
- (3) **Non-healing** See under chronic ulcers
- Treatment (1) **Stoppage of hæmorrhage** See under hæmorrhage
- (2) **Cleansing or toilet**
  - (a) Antiseptic applications
    - ( $\alpha$ ) dry method
    - ( $\beta$ ) wet method
  - (b) Excision of exposed tissues
    - debridement
  - (c) Evacuation of clots or foreign bodies
- (3) **Exploration**
  - (a) Search for injuries to other structures
    - vessels
    - nerves
    - tendons
    - bones
    - joints
    - viscera
  - (b) Search for foreign bodies
- (4) **Coaptation**: sutures
  - (A) Varieties
    - (a) Without drainage complete
      - Ind surety of asepsis
    - (b) With potential drainage partial
      - Ind doubtful asepsis
      - Tech distant sutures
    - (c) With temporary drainage
      - Ind ( $\alpha$ ) doubtful asepsis
      - (b) insufficient or doubtful hæmostasis
      - (c) severe laceration or contusion
      - (d) actual or potential cavity
      - Tech small rubber drain for 36 to 48 hours

- (d) With established drainage
  - Ind (a) sepsis
  - (b) rupture of internal hollow organs
  - Tech dependent rubber drain till the discharge stops
- (B) Time of coaptation
  - (a) Primary Immediate
    - Ind sure asepsis
  - (b) Delayed after three days but before granulations
    - Ind doubtful asepsis
  - (c) Secondary after the appearance of granulations
    - Ind sepsis and sloughing
- (5) After-treatment
  - (A) Dressings
    - (a) Dry in clean cases
    - (b) Moist in septic cases
    - (c) Hypertonic in sepsis and sloughing
    - (d) Irrigations in bad sepsis
    - (e) Emollient in clean granulating wounds
  - (B) Rest
    - (a) Avoidance of friction
    - (b) Splints and plasters
    - (c) Avoidance of irritating antiseptics in healing stages

*(For special wounds see under respective heads)*

## (C) BURNS

Def Burns dry heat

Scalds Moist heat boiling liquids or steam

Local degrees (1) Superficial

- (a) First degree erythema-ab-ligne
- (b) Second degree blisters → pigmentations
- (a) Third degree papillary layer  
thin, white, supple scars

(2) Deep

- (a) Fourth degree whole skin  
contractures and keloids
- (b) Fifth degree soft parts upto bone
- (c) Sixth degree complete charring

General conditions

- (1) Primary shock Traumatic
  - Path nervous
  - Time immediate



- (c) **Specific** as in boil
- (d) **Local** as in boil
- (e) **Non-specific Protein Therapy**
  - (1) Aolan 10 c.ca. intramuscular daily
  - (2) Omnadin intramuscularly
  - (3) Activein intramuscularly
- (f) **Circumferential** in normal tissues around
  - (1) Painting with Lin. or Tr Iodine
  - (2) Injections
    - (a) carbolic acid min. 1
    - (b) 20 c.ca. of auto blood  
+  
2 c.ca. of 2% sod. citrate
- (g) **Operative**
  - (1) Excision in toto
  - (2) Crucial incisions with under mining of flaps
- (h) **Post-operative** or after burst treatment
 

Packs of

  - (a) Hypertonic saline
  - (b) Saturated mag sulph with glycerine
    - (a) Paste of mag sulph dried lb.  $1\frac{1}{2}$   
glycerine oz. 10
    - (b) Mag. sulph 40  
Boiled water " 30  
Glycerine 10
  - (c) 10% Sod. sulphate
  - (d) 10% Glycerine and Ichthyol
- (B) **Diabetes**
  - (a) Dietetic
  - (b) Insulin with glucose
  - (c) Soda-bi-carb

#### Special precautions

- (1) Examine the urine for sugar and acetone every day or twice a day
- (2) Watch for
  - (a) Coma
  - (b) Hypoglycæmia
  - (c) Septicæmia or Pyæmia

### (3) ABSCESS:

Def A localized collection of pus

Path	(a)	Infection by a pyococcal organism
	↓	
	(b)	Inflammation of the surrounding tissues
	↓	
	(c)	Liquefaction of the dead cells and organisms
	↓	
	(d)	Circumscription of the process by formation of abscess wall
	↓	
	(e)	Rupture
Clinic	(a)	<b>Local</b>
	(1)	Signs of inflammation
	(2)	Signs of circumscribed fluid, viz fluctuation
	(b)	<b>Regional</b> Lymphangitis and lymphadenitis
	(c)	<b>Constitutional</b> Toxaemia
Compl	(d)	<b>Laboratory</b> Leucocytosis
	(a)	<b>Abnormal rupture</b> (a) non-dependent (β) into other organs
	(b)	<b>Failure of localization</b> cellulitis, lymphangitis
	(c)	<b>General dissemination</b> septicæmia pyæmia
Treat	(1)	<b>Local</b>
	(A)	<b>Early</b> Rest and hyperæmia
	(B)	<b>Operative</b>
	(a)	incision and evacuation
	(b)	breaking the septa
	(c)	dependent drainage
	(C)	<b>Post-operative</b>
		hypertonic and antiseptic dressings
	(2)	<b>Constitutional</b> Iron arsenic
	(3)	<b>Specific</b>
	(a)	sulphanilamide group of drugs
	(b)	vaccines and sera

#### Technic of opening an abscess

- (1) **Incision :**
  - (a) parallel to important structures
  - (b) away from important structures
  - (c) at the most dependent part
- (2) **Evacuation**
  - (a) regular method
  - (b) Hilton's method incision of skin and evacuation by blunt forceps
- (3) **Breaking down all the septa**

- (2) **Regional**  
 (a) Lymphadenitis  
 (b) Sinus thrombosis  
 (c) Edema glottis  
 (d) Venous thrombosis
- (3) **General**  
 (a) Toxæmia  
 (b) Septicæmia
- (4) **Sequelæ**  
 (a) Lymphatic and venous obstruction  
 (b) Fibrosis
- Treatment**
- (1) **Prophylactic**  
 (a) free drainage in potential infections  
 (b) sulphanilamide group drugs
- (2) **of established disease**
- (A) **Local**  
 (a) **expectant**  
 (1) Rest warmth, Bier  
 (2) Robt's adhesive elastic bandage  
 (b) **operative** Free incisions  
 (c) **post-oper** Antiseptic and hypertonic baths, packs or irrigations
- (B) **Specific**  
 (a) Sulphanilamide group  
 (b) Anti streptococcal serum
- (C) **General** Tr Farri perchlor and tonics
- Special Sites**
- (1) **Scalp** Sub-aponeurotic cellulitis  
 Etio Wounds boils  
 Clinic Diffuse swelling upto aponeurotic limits  
 Compl (a) necrosis skull  
 (b) sinus thrombosis  
 (c) meningitis  
 Treat Early incisions parallel to arteries
- (2) **Orbit** Inflammation of the orbital cellular tissues  
 Etio Wounds sinusitis  
 Clinic Chemosis, proptosis ophthalmoplegia  
 Compl (a) Panophthalmitis  
 (b) Cavernous sinus thrombosis  
 (c) Meningitis  
 Treat (1) Incisions in eyelids and fornices of conjunctivæ  
 (2) Evisceration of the eyeball
- (3) **Neck**  
 (A) Cellulitis neck  
 (B) Sub-maxillary cellulitis Ludwig's angina  
 Etio (a) Septic trauma  
 (b) Septic focus tonsils, mastoid, jaw teeth salivary glands

Clinic Painful tender brawny induration with stiffness  
 Compl (a) Oedema glottis  
 (b) Mediastinitis  
 Treat Early open incisions, Hilton's evacuation Hyper  
 tonic packs

(4) **Mediastinitis** Diffuse septic inflammation of mediastinal cellular tissues

Etio (a) Cellulitis neck  
 (b) Septic focus trachea, bronchus, oesophagus, lymph glands

Clinic (a) pressure signs \* Dysphagia, dyspnea  
 (b) signs of sepsis

(5) **Retroperitonitis** Diffuse septic inflammation of extra peritoneal cellular tissues

Etio (a) Extraperitoneal perforation Duodenum appendix ascending and descending colon  
 (b) Acute pancreatitis  
 (c) Extravasation of urine :

Clinic (a) Local spreading inflammatory signs  
 (b) General inflammatory toxæmia

Compl (a) Sloughing and gangrene of the abdominal wall  
 (b) Abscesses  
 (c) Multiple sinuses or fistulae

Treat (1) Treat the primary focus  
 (2) Drain (a) the primary focus  
 (b) cellular tissues

(6) **Pelvic Cellulitis**

Etio (a) Septic laceration cervix uteri (septic delivery)  
 (b) Extravasation of urine from  
 (a) extraperitoneal rupture of the bladder  
 (b) rupture posterior urethra

Clinic (1) Tender brawny inflammatory induration creeping up behind and deep to the symphysis and anterior abdominal muscles  
 (2) Tender mass on rectal or vaginal palpation  
 (3) General toxæmia

Compl (a) Diffuse sloughing and gangrene  
 (b) Multiple abscesses with sinuses  
 (c) Thrombosis of veins with septic embolism  
 (d) Acute toxæmia or septicæmia  
 (e) Recurrences → Elephantiasis leg white leg

Treat (1) Prophylactic Early diagnosis and treatment of primary focus with free drainage.

(2) **Therapeutic**

- (a) **Expect** Local heat baths, douches, enemas, fomentations
- (b) **Oper** (1) Incisions and drainage  
(2) Posterior Colpotomy
- (c) **Post-oper** Hypertonic and antiseptic packs, baths, irrigations

(7) **Cellulitis scrotum**

- Etio** (a) rupture anterior urethra  
(b) elephantiasis of the scrotum
- Clinic** Tender brawny induration of the scrotum and penis creeping up superficial to the symphysis and abdominal muscles but not entering the thigh or perianal region
- Compl** (a) sloughing or gangrene  
(b) multiple urinary fistulae or sinuses  
(c) acute toxemia or septicemia
- Treat** (a) multiple incisions and drainage  
(b) treatment of primary cause  
(c) general and specific treatment

(6) **PROGRESSIVE POST-OPERATIVE IDIOPATHIC GANGRENE OF THE SKIN AND SUBCUTANEOUS TISSUES**

- Etio** (1) Post-operative or traumatic appendicectomy empyema  
(2) Idiopathic
- Cause** Infection by (a) hemolytic streptococcus  
(b) staphylococcus
- Clinic** Persistently progressive gangrene of the skin and subcut. tissues
- Treat** (a) Circumscription by incision which is packed daily with 10% formalin  
(b) Caustic circumscription  
(c) Caustic excision of advancing edges

**III. CHRONIC AFFECTIONS OF THE SKIN AND SUBCUTANEOUS TISSUES**(1) **IRRITATION DERMATITIS**

- Etio** Contact with irritant discharges with chemical or septic action
- Sites** Around (a) fistulae gastric intestinal biliary urinary  
(b) septic wounds or drains
- Clinic** Irritant dermatitis

Compl	(a) ulceration		
	(b) cellulitis		
	(c) gangrene		
Treat	(a) Protection	Emollients	sterile vaseline, paraffin
	(b) Anti-chemicals	(a) Soda bi-carb if acid	(β) Citric acid if alkaline

## (2) TUBERCULOSIS OF THE SKIN AND SUBCUTANEOUS TISSUES

### (A) LUPUS VULGARIS

Eti age Children and young adults  
site Face

Path Tuberculous giant cell system

Clinic (a) apple jelly sub-epidermal nodule

↓  
(b) coalescence patch

↓  
(c) central ulceration with peripheral spread

↓  
(d) central scar surrounded by zone of ulceration,  
surrounded by zone of peripheral nodules

↓  
(e) deep spread → loss of cartilages

Diff. diag (1) Syphilitic perichondritis and necrosis  
(2) Lupus erythematosus  
(3) Eczema  
(4) Rodent ulcer

Compl (1) Deformity  
(2) Secondary sepsis  
(3) Recurrences  
(4) Epithelioma  
(5) Erysipelas

Treat (1) Excision of the whole patch with  $\frac{1}{2}$  all around

(2) Scraping with application of caustics

(3) Vapour Lamp Finsen or Mercury

(4) Ultra violet exposures

(5) Infiltration with

(a) Phenyl ethyl Hydrocarpnate

(b) Sodium morrhuate

(6) Electro coagulation

(7) General treatment

(a) Diet rich in vitamins

(b) Light baths general exposure to the sun

(8) Tuberculin

(B) SCROFULODERMIA T. B. *tuberculosis*

Etio (a) Primary

(b) Secondary to deeper lesions

T B glands or joint

Chronic Chronic multiple ulcers with

edges thin and undermined

base pale ochraceous granulations

discharge      watery

surroundings bluish congested

scar irregular puckered

Treat (1) Exclusion

(2) Scraping  $\rightarrow$  B.I.P.P  $\rightarrow$  plaster

(3) **Ultra-violet exposures**

(C) ERYTHEMA INDURATUM BAZIN'S DISEASE

**Etio** Young girls

Site Posterior aspect of lower third of the leg

Clitic (a) Nodules purplish

1

(b) Ulcers circular indolent

1

(o) Scars pigmented

Diff diag (1) Erythema nodosum

(2) Cutaneous gummatas

Treat (1) Rest Elastoplast compression

(2) Deep X Ray exposures

(3) Lumbar ganglionectomy

(D) LUPUS VERRUCOSUS BUTCHER'S WART

Site Side of finger nails

**Clinic** (1) Nodular induration Irregularly circumscribed

1

(2) Wart chronic indolent

(3) Regional lymphadenitis

Diff. diag (1) **Paronychia**

(2) **Change of the finger**

(3) **Melanoma malignum**

Treat (1) Salicylic acid (25%) plaster application

(2) **Excision** of the (a) patch  
(b) lymph glands

(b) lymph glands

(3) Deep X Ray exposures

### (3) VENEREAL AFFECTIONS OF THE SKIN AND SUBCUTANEOUS TISSUES

(A) SYPHILIS OF THE SKIN :

(see under venereal diseases)

(1) **Primary chancre**

## (2) Secondary rashes

- (a) Roseolar or macular
- (b) Papular
- (c) Papulo-squamous
- (d) Squamous
- (e) Papulo-pustular
- (f) Pustular
- (g) Frambæsiiform
- (h) Follicular small and large
- (i) Echthymatous rupm
- (j) Pigmentary

## (3) Tertiary affections

- (a) nodular cutaneous syphilides
- (b) subcutaneous gummata

## (4) Congenital syphilitic affections of the skin

- (a) Pemphigus
- (b) Maculo-papular rash
- (c) Gummata of the skin
- (d) Gummatous ulcers

**Gumma of the skin**

Eti	Syphilis: congenital and tertiary
Path	Subcutaneous round celled induration
	↓
	Secondary infection
	↓
	Suppuration
	↓
	Gummatous ulcer
Clinic	(1) Induration large, hard indolent circular
	↓
	(2) Induration with inflammatory reaction
	↓
	(3) Liquefaction with secondary sepsis
	↓
	(4) Ulceration with
	Shape round or terpiginous
	Edge punched out
	Base wash leather slough
	Discharge gummy
	Surroundings healthy
	Scar round thin, papery
	Site: Symmetrical sternum knee
Treat	(1) Antisyphilitic
	(2) Mercurial ointments
	(3) Pot. Iodide large doses



(B) **SOFT CHANCER** See under venereal diseases

(C) **GRANULOMA PUDENDA:**

See under venereal diseases

#### (4) **TROPICAL DISEASES OF THE SKIN AND SUBCUTANEOUS TISSUES**

(A) **TROPICAL SORE** Dermal Leishmaniasis

Def	Chronic granuloma due to <i>Leishmania Tropica</i>
Etio	Sand flies
Sites	Exposed parts of the body
Clinic	(1) Papule small red ↓ (2) Ulcer multiple, superficial chronic, crusty or (3) Nodule
Sign	Leishman found in the scrapings of margins
Diff. diag	Any other chronic ulcer
Treat	(1) Tartar emetic (total dose 20-30 gr) intravenous $\frac{1}{2}$ gr-2 $\frac{1}{2}$ gr in 10 c.c. saline (2) Phosphorus oil 3 min applied directly or injected round the margin (3) Curetting followed by carbolic acid cauterization

(B) **LEPROSY** See under leprosy

- (1) **Primary Skin lesion** Tuberculate or nodular diffuse infiltration or definite nodules with loss of hair  
Sites face, ear eyebrows, nose
- (2) **Secondary lesions in nerve leprosy**
  - (a) perforating ulcers
  - (b) anæsthetic patches discoloured, hairless, sweatless.

(C) **MYCETOMA FOOT** See under affections of the foot

(D) **AMÆBIASIS OF THE SKIN**

Etio	Infection with <i>amœba histolytica</i>
Clinic	(a) massive gangrene (b) ulcers (c) fistulae (d) warts
Sites	(a) abdominal wall liver area, colostomy area (b) peri-anal
Diff. diag	any other ulcerating granuloma (a) gummatous ulcer (b) T. B. ulcer

- (c) actinomycosis  
(d) post-operative idiopathic gangrene

Treat Inj of emetine hydrochlor

## (5) PARASITIC DISEASES OF THE SKIN AND SUBCUTANEOUS TISSUES

### (A) GUINEA WORM

Parasite Female 500—800 mm.

Male 22 mm.

Cycle water

↓  
cyclops quadricornis 3—5 weeks

↓  
human body 1 year

↓  
presentation of the female with discharge of ova

↓  
water

Sites Foot, ankle, hand

Clinic (1) Lump or cord like swelling

↓  
(2) Blister with surrounding inflammation

↓  
(3) Ulcer pinpoint central opening

↓  
(4) Presentation of the worm with milky discharge

↓  
(5) General signs (a) eosinophilia  
(b) urticaria  
(c) toxæmia

Compl (a) sepsis abscess, cellulitis tenosynovitis, arthritis

(b) calcification

(c) cyst formation

(d) urticaria dyspnoea, asthma

Treat (1) Before presentation Excision en mass

(2) After presentation

(a) Extraction

(a) gradual

(β) rapid 24 hours after injection of mercury bichloride 1-1000 in the worm

(b) Cold baths Compresses, irrigations immersions, water drip

(3) Preventive

(a) protection of drinking water

(b) boiling the drinking water

(c) addition of a trace of potash

**(B) FILARIASIS** See under filariasis

Skin lesions obstructive dilatation and varicosity of lymphatics with lymphatic oedema or lymphorrhoea

- Sites (1) Elephantiasis of the scrotum and penis  
 (2) Elephantiasis of the limbs  
 (3) Filarial abscesses

**(6) OTHER CHRONIC DISEASES OF THE SKIN****(A) GLANDERS** See under Glanders

Skin lesions (1) Wound of entrance erysipelatoid tumidity and lymphangitis  
 ↓  
 (2) Cutaneous lesions

**(A) Acute**

- (a) eruptions papular vesicular pustular  
 (b) ulceration serpiginous  
 (c) gangrene local

**(B) Chronic ulcer** indolent, indurated  
 serpiginous

Diff diag any other lesion of the skin  
 syphilis, tuberculosis, actinomycosis  
 leprosy anthrax, tropical sore

**(B) ACTINOMYCOSIS** See under Actinomycosis

Skin lesions (a) chronic progressive granulomatous and fibrous infiltration of the connective tissues  
 +  
 (b) multiple small abscesses → Sinuses  
 +  
 (c) viscid exudate with yellow granules

**(C) ANTHRAX** See under anthrax

Skin lesions (a) Pimple  
 ↓  
 (b) Papule  
 ↓  
 (c) Pustule  
 ↓  
 (d) dry black slough surrounded by vesicles,  
 surrounded by red indurated oedema

Diff. diag Boil septic focus cellulitis

**(D) ELEPHANTIASIS**

Def A progressive fibrosis and hyperplasia of the dermis and subcutaneous tissues

Nomenclature (1) Elephantiasis Nostras non parasitic  
 (2) Elephantiasis Arabum parasitic

- Varieties** (1) **Congenital** Milroy's disease
- (a) simple
  - (b) familial hereditary trophoedema
- Etiol** hereditary maldevelopment of lymph vessels and tissues
- Path** dilated lymph spaces  
fibrous tissue hyperplasia
- (2) **Obstructive** :
- (a) removal of lymph glands
  - (b) cicatricial obliteration of lymphatics
  - (c) glandular sepsis with abscess
- (3) **Infective**
- (a) Filarial
  - (b) Bilharzial
  - (c) T. B.
  - (d) Syphilis
  - (e) Leprosy
  - (f) Granulomatous venereum inguinale
- (4) **Malignant**
- (a) Lymph vessels permeation
  - (b) Lymph glands infiltration  
permeation  
embolism  
removal
- (5) **Bacterial** strepto and staphylococcal recurrent lymphangitis and cellulitis (white leg)
- (6) **Toxic** chrysarobin
- Comp** (1) Sepsis Streptococcal lymphangitis or cellulitis  
(2) Paralysis
- Treat**
- (1) **Palliative**
- (1) Postural Elevation
  - (2) Elastic Compression
  - (3) Massage
  - (4) Injections
- (a) anti-streptococcal serum
  - (b) sulphanilamide group
  - (c) vaccine therapy
  - (d) fibrolysin injections
  - (e) foreign protein therapy
  - (u) T.A.B Vaccine
  - (B) aolan
  - (Y) whole blood
- (5) **Internal medication** Pot. Iodide

**(II) Operative :**

- (1) **Kondoleon :** Elliptical excision of skin, subcutaneous tissues and deep fascia so as to expose the muscles
- (2) **Radical excision** as in penis and scrotum
- (3) **Lymphangioplasty** Silk implantation  
Ind malignant elephantiasis of the upper extremity with no septic complications

## IV ULCERS OF THE SKIN AND SUBCUTANEOUS TISSUES

**Def** Breach of surface of the skin or mucous membrane as a result of gradual disintegration

- Etiology**
- (1) **Trauma**
  - (2) **Lowered tissue vitality :**
    - (a) local
    - (b) general circulatory nervous, metabolic
  - (3) **Sepsis**

**Pathology** varieties

- (1) **Traumatic**
  - (a) abrasion
  - (b) wound
  - (c) burns
- (2) **Circulatory :**
  - (a) bed sore
  - (b) varicose
  - (c) gravitational
  - (d) anæmic
- (3) **Neurogenic**
  - (a) bed sore
  - (b) perforating
- (4) **Metabolic**
  - (a) diabetic
  - (b) gouty
- (5) **Mechanical :**
  - (a) too extensive
  - (b) failure of coaptation of edges
  - (c) irritation
- (6) **Septic**  
after any septic process underneath
- (7) **Specific**
  - (a) Tuberculosis
  - (b) Syphilis

- (c) Soft chancre
- (d) Leprosy
- (e) Tropical
- (f) Glanders
- (g) Anthrax
- (h) Actinomycosis
- (B) New growths
  - (a) Innocent
    - (1) Ulcerating cystadenoma
    - (2) Infected sebaceous cyst
  - (b) Malignant
    - (1) Carcinoma
      - (a) Carcinomatous ulcer
      - (β) Ulcerating carcinoma
    - (2) Sarcoma : fungating
    - (3) Melanoma

# Clinical stages

## (A) Acute or spreading

- Clinic      surface    slough-covered  
                  edges    extending inflamed  
                  discharge    copious, dirty  
                  surroundings    inflamed
- Treat (a) hypertonic packs, baths or irrigation  
                  saline or mag sulph  
                  (b) complete rest with elevation  
                  (c) general & specific treatment

## (B) Transitional

- Clinic      surface    clean  
                  edges    stationary, moderately inflamed  
                  discharge    minimum serous  
                  surroundings    moderately inflamed
- Treat mild antiseptic dressings    acriflavine

## (C) Healing

- Clinic      surface    clean dry red granulations  
                  edges    shelving with epithelization  
                  discharge    nil  
                  surroundings    healthy
- Treat (a) Emollient non irritating dressings  
                  vaseline, paraffin  
                  (b) Rest    splints and infrequent dressings

## (D) Abnormal Stationary :

- (a) callous  
                  surface    flabby hypersemic, raised granulations  
                  base    adherent to underlying structures  
                  edges    hard and raised  
                  discharge    irritant  
                  surroundings    indurated & pigmented

(1) General

- (1) Constitutional disturbances debility
- (2) Circulatory disturbances arteriosclerosis
- (3) Neurogenic disturbances Tabes dorsalis
- (4) Metabolic disturbances Diabetes
- (5) Specific disturbances Syphilis

(II) **Regional**

- |     |             |                     |
|-----|-------------|---------------------|
| (1) | Circulatory | varicose veins      |
| (2) | Neurogenic  | peripheral neuritis |

(III) **Local**

- (1) Mechanical friction movement, displacement of epithelium
- (2) Anatomical adherence to deeper structures, rigidity of surroundings
- (3) Physiological circulatory inefficiency due to fibrosis or too large surface
- (4) Chemical too strong or too long irritant antiseptics
- (5) Specific T B actinomycosis tropical sore
- (6) Neoplastic

- (1) Treat the cause    general regional local
- (2) Local treatment    applications

- (a) Callous (a) Occasional canterization  
 $\text{AgNO}_3$  or  $\text{CuSO}_4$

↓

- (β) Dressings  
(1) hypertonic  
↓  
(2) mild antiseptic  
↓  
(3) emollient

- (b) **Weak and Anemic:** Scarlet red  
Stimulant dressings Unna's plaster  
Friar's balsam

- (3) **Regional treatment**
  - (1) Rest by plasters and splints in callous irritated ulcers
  - (2) Bier's hyperæmia and massage in weak and anæmic ulcers
- (4) **General treatment**
  - (1) Tonics
  - (2) Specific
- (5) **Operative treatment**
  - Ind (1) Neoplastic ulcers
  - (2) Ulcers with elephantiasis
  - (3) Very extensive ulcers
  - (4) Failure of conservative treatment
  - (5) Ulcers near joints
  - (6) Recurrences after healing
  - Tech (1) Bipping and plastering
  - (2) Scraping
  - (3) Excision
  - (4) Skin-grafting
  - (5) Nerve stretching
  - (6) Sympathectomy
    - (a) Penarterial
    - (b) Central

## SOME SPECIAL ULCERS

### (1) BURNS ULCER

- Etio Burns (a) Thermal
- (b) Chemical accidental applications  
ill-placed injections
- (c) Radium & X Rays
- Path (a) Third degree thin white, supple, papery scar
- (b) Fourth degree irregular scars with keloids  
and contractures
- Special compl (a) Non-healing
- (b) Fibrosis and its sequelæ
- (c) Discoloration and deformity
- Special treat (a) Tannic acid healing under scab
- (b) Emollient infrequent dressings of raw areas
- (c) Preventive splintage
- (d) early skin-grafting

### (2) PRESSURE SORES

- Def Gangrenous non inflammatory spreading ulcer due  
to necrosis of the skin and subcutaneous tissues
- Etio (1) Predisposers :
  - (1) chronic exhausting diseases
  - (2) circulatory inefficiency
  - (3) nervous inefficiency



**(C) Moderate ulcer**

Etio Failure of deep veins white leg

Clinic Area more than four square inches

Treat (1) Pull the edges together by sticking plaster  
 (2) Elastoplast strapping from toes to knee  
 (change every 4th → 7th → 14th day)  
 (3) Injection treatment of varicosities

After treat Firm crepe bandage elastic stockings

**(D) Indurated ulcer**

Clinic Much induration with solid cedema

Treat Tightest possible elastic bandage

**(E) Malleolar ulcer Irritable ulcer**

Etio Femoral vein thrombosis

Site Malleolar sulcus

Clinic Irritable and painful

Treat (1) Aspirin or Percain dusting  
 ↓  
 (2) Pull together the edges with adhesive plaster  
 ↓  
 (3) Adhesive felt  
 ↓  
 (4) Dunlopillo-sorbo pad  
 ↓  
 (5) Elastoplast bandage from toes to knee

**(F) Eczematous ulcer**

Clinic Chronic ulcer surrounded by eczema

Treat (1) Apply (a) Ung bismuth et Quinolins  
 or  
 (b) Coal tar drachm one  
 Zinc oxide drachm one  
 Lanoline and Vaseline ad oz. one  
 (2) Elastoplast bandage over the ointment

**(G) Extensive ulcer**

Clinic Area 10 square inches and more with much cedema

Treat (1) Rest, elevation and firm bandage  
 (2) Injection treatment of varicose veins  
 (3) Skin-grafting Reverdin method  
 (4) Elastic stockings

**(4) PERFORATING ULCER**

Etio Nervous disease central spinal peripheral

Site (a) Plantar side of first metatarsal head Tabes

(b) Radial side of second metacarpal syringomyelia

Clinic (a) Sinus with cornified epithelium leading to bone  
 (b) Absolute painlessness

- (c) Sensory disturbances in the surrounding area
- (d) Signs of underlying nervous disease
- (e) Sometimes maggots

- Treat
- (a) Antiseptic dressings
  - (b) Periarterial sympathectomy + scraping
  - (c) Nerve stretching

## (5) OSTEOMYELITIC ULCER

- Etiology Underlying bone sepsis : unhealing ulcer after
- (a) Separation of gangrenous part
  - (b) Drainage of osteomyelitis
  - (c) Amputation
- Clinic
- (a) Indolent callous ulcer } leading to necrosed bone
  - (b) Sinus
  - (c) Irritant discharge
- Complication
- (a) Non-healing
  - (b) Dermatitis
  - (c) Epithelioma
- Treat Scraping or excision of the bone

## (6) DIABETIC ULCER

- Etiology Diabetes
- (a) Following gangrene
  - (b) Following trauma with sepsis
- Path Factors
- (a) Circulatory disturbances
  - (b) Neuritis
  - (c) Lowered tissue vitality
- Clinic Non healing chronic callous ulcer after
- (a) Separation of gangrenous part
  - (b) Septic trauma
- Treat
- (1) General Anti-diabetic Dietetic, Insulin
  - (2) Local
    - (a) Conservative Dressings
    - (b) Operative
      - (1) Scrapings
      - (2) Periarterial sympathectomy + Vein ligation
      - (3) Amputation

## (7) MECHANICAL ULCER

Etiological Treatment

- (a) Too extensive Skin-grafting
- (b) Adhesion Excision + skin-grafting
- (c) Failed coaptation Burned sutures
- (d) Faulty dressings
  - (1) Avoid epithelial displacement
  - (2) Avoid too strong antiseptics
  - (3) Avoid friction and movement
  - (4) Avoid moisture

(8) **SPECIFIC ULCER** See under respective diseases of the skin

(9) **NEOPLASTIC ULCER** See under new growths of the skin

(10) **DIPHTHEROID ULCER** (Med. Annual 1938)

Clinic (a) **Necrotic pustule**



(b) **Superficial rapidly extending ulcer**

(1) **Red oedematous surroundings**

(2) **Bluish red swollen edges**



(3) **Thick adherent slough**

(4) **Bright red granulating surface**

(5) **Seropurulent discharge**

(c) **Verrucose scar**

Path Diphtheroid organisms

Treat (a) **Autogenous vaccine**

(b) **Local application of Permyase**

## V SINUSES AND FISTULAE OF THE SKIN

Def **Sinus** A narrow track lined with granulations, opening on a surface at one end the second end ending blindly in a septic focus

**Fistula** An abnormal communication lined by granulations between two cavities or between a cavity and a surface

Etiology (1) **Mechanical**

(a) **Persistent cavity** empyema, burse

(b) **Adhesion to bones** suprapubic

(c) **Absence of raw surface on apposing walls**

(d) **Surrounding fibrosis**

(e) **Absence of rest**

(f) **Distal obstruction**

(2) **Chemical** Irritant discharges

(3) **Infective:**

(a) **Continued sepsis** osteomyelitis

(b) **Septic foreign body**

(a) **Auto sequestrum**

(β) **Hetero foreign body**

(c) **Faulty treatment** bad drainage

(4) **Specific**

(a) **T B.**

(b) **Mycetoma**

(c) **Actinomycosis**

(d) **Schistosomiasis**

- (5) **New growth**
  - (a) Direct infiltration fungation
  - (b) Sepsis
  - (c) Distal obstruction faecal fistulae
- (6) **Congenital**
  - (a) Cervical sinus
  - (b) Sub-mental or mental sinus
  - (c) Post anal and sacral sinus
  - (d) Urinary or faecal fistulae
- (7) **Ulcerative**
  - (a) Perforating ulcer
  - (b) bed sore
- Diagnosis**
  - (1) **Examination of the discharge**  
Clinical chemical microscopical
  - (2) **Probing** depth direction base
  - (3) **Injection of dyes** in fistulae in ano
  - (4) **X Rays** Plain and after lipiodol
  - (5) **Scraping** and microscopical examination
  - (6) **Biopsy**
- Treat**
  - (1) **Treatment of underlying cause**  
local regional general
  - (2) **Local**
    - (a) Winnet orr BIPP and plaster
    - (b) Scraping and BIPP
    - (c) Incision scraping and drainage
    - (d) Excision in toto
    - (e) Dependent drainage of underlying septic focus
    - (f) Short circuit
  - (3) **Regional** Protect the surrounding skin by
    - (a) Emollient applications
    - (b) Anti-chemical applications

## VI. NEW GROWTHS OF THE SKIN AND SUBCUTANEOUS TISSUES

### (1) CYSTS

#### (A) RETENTION CYSTS

##### Sebaceous Cyst

**Def** Retention cyst due to obstruction to the mouth of a sebaceous duct or a hair follicle

**Sites** Face, scalp scrotum Not on palms and soles

**Clinic** Subcutaneous globular swelling of varying consistency adherent to the skin at one black spot

- Compl (a) Infection  
       (b) Ulceration   Cock's peculiar tumour  
       (c) Sebaceous horn  
       (d) Calcification  
       (e) Malignancy  
 Treat (1) Transfixion and excision  
       (2) Dissection and excision

## (B) EXUDATION CYST

- (a) Lymph cyst  
 (b) Blood cyst

## (C) DERMOID CYST

Def Congenital cyst from a rudiment of a surface epithelium, which has remained included in deeper tissues or from a vestigial epithelium lined structure

- Path Source Epiblast buried in mesoblast  
 Varieties (a) Implantation dermoid Traumatic  
           (b) Sequestration dermoid Congenital  
           (c) Tubulo-dermoid Vestigial  
 Morb anat (a) Wall fibrous  
           (b) Lining Squamous  
           (c) Contents Sebaceous  
 Sites Surface-joint line

### (A) Sequestration

#### (1) Head and Neck

##### (A) Face

- (a) Outer angle orbit  
 (b) Inner angle orbit  
 (c) Naso-facial sulcus  
 (d) Oro-auditory sulcus  
 (e) Nasal root

##### (B) Scalp

- (a) Ext. occipital protuberance  
 (b) Ant. fontanelle  
 (c) Midline

##### (C) External Ear

##### (D) Mastoid

##### (E) Neck

- (a) Midline  
 (b) Lateral branchial

#### (2) Trunk Midline anterior and posterior

### (B) Implantation Post traumatic epidermoid cyst

- (1) Hand Palmar surface of fingers  
 (2) Eyes Iris and cornea

Compl (1) Infection Inflammation suppuration ulceration

(2) Malignancy

Clinic (1) Purely subcutaneous non-adherent cyst

(2) Special site

Treat Excision

Differential Diagnosis of subcutaneous cystic swellings

(1) Sebaceous cyst

(2) Cold abscess

(3) Dermoid cyst

(4) Ganglion

(5) Bursitis

(6) Meningocele

(7) Aneurysm

(8) Lymph cyst

(9) Blood cyst

(10) Liquefying gumma

(11) Encysted lipoma, fibroma or angioma

## (2) GROWTHS OF THE SKIN AND SUBCUTANEOUS TISSUES

### (A) INNOCENT GROWTHS OF THE SKIN AND SUBCUTANEOUS TISSUES

#### (1) PAPILLOMA

##### (a) Warts

Hypertrophied skin papillae covered by an overgrowth of epidermis

##### (a) Flat warts

Etio Contagious infection due to filter passing virus

Sites Hands, forearms, face, soles

Clinic Multiple crops

Treat (a) 10% salicylic acid collodion

(b) Glacial acetic acid

(c) Fuming nitric acid

(d) X Rays

(e) Radium

(f) Carbon dioxide snow

(g) Scraping & iodine dressing

##### (B) Pedunculated warts

Etio Irritation Irritating discharges

Site Genitals

Treat (a) Dry cleaning zinc boric powder

(b) Caustery

(c) X Rays

(d) Radium

- Sites neck abdominal wall muscles  
 Compl (a) Ventral hernia  
       (b) Loss of action of a muscle  
       (c) Deformity

(9) **MALIGNANT SCAR** : Marjolin's epitheliomatous ulcer

- Path Epithelioma in a scar  
 Clinic Carcinomatous ulcer with  
       (a) slow growth  
       (b) no pain  
       (c) no glands  
 Treat (1) Free excision and skin-graft  
       (2) Amputation

## VIII AFFECTIONS OF THE NAILS

### (I) TRAUMA

#### (1) CONTUSION

- Etio crushes  
 Clinic painful discoloration  
 Compl (a) sepsis  
       (b) separation of the nail  
       (c) fracture phalanx  
 Treat (1) Conservative Cold compresses  
       (2) Evacuation of the subungual hæmatoma

#### (2) AVULSION :

- Clinic extreme pain due to exposure of the sensitive nail matrix

#### (3) FOREIGN BODIES

- Etio needles thorns, wood chips  
 Compl sepsis  
 Treat removal

### (II) INFLAMMATION

#### (A) ACUTE

- (1) **Onychia** (See infections of the hand)  
 (2) **Paronychia** : (See infections of the hand)

#### (B) CHRONIC

- (1) **Syphilis** (See infections of the hand)  
       (a) Primary chancre  
       (b) Secondary onychia and paronychia  
       (c) Congenital syphilitic onychia  
 (2) **T B** : (See chronic affections of the hand)  
 (3) **Ingrowing toe nail** (See foot ulcers)

**(III) GROWTHS****(1) Subungual exostosis**

Painful displacement of the nail due to growing exostosis from the last phalanx of the great toe (See under foot)

**(2) Melanotic whitlow**

(See under skin and melanoma)

## **IX. PLASTIC OPERATIONS OF THE SKIN AND SUBCUTANEOUS TISSUES**

**Aims** (1) Shortening the period of and aiding the surface healing

(2) Cosmetic

(3) Prevention and treatment of abnormal scar

(4) Restoration of function

**Indications**

**(1) Burns**

(a) primary failure of healing

(b) secondary abnormal scar

**(2) Malignancy defects after radical excision**

(a) primary

(b) secondary

**(3) Trauma** Skinning of scalp or scrotum**(4) Sepsis** Chronic large ulcers

**Pre-operative considerations**

**(A) Local**

(1) Quantity of tissues lost

(2) Character of the tissues lost

(3) Shape of the tissues lost

(4) Dimensions of the tissues lost

(5) Site from where the graft can be taken

(6) Nature of the graft

(7) Method of transference of the graft

**(B) Regional**

Adaptation and fixation of the recipient and donor area to each other

**(C) General**

(a) good general health

(b) absence of metabolic and specific diseases

**Pre-operative preparation**

(1) Render the area devoid of sepsis and inflammation

(2) Non-irritant dressings for a week previous

(3) Pre-operative adaptation of donor area to recipient area

(4) Non-irritant preparation of both the areas



**Operative technic**

- (1) Site of the graft
  - (a) similarity of skin
  - (b) availability with ease
  - (c) good circulation
  - (d) concealed position
  - (e) no local sepsis
- (2) Incisions clean incisions to follow tension lines and natural creases and preserving blood supply
- (3) Removal of the granulations from recipient area
- (4) Minimum and delicate handling of tissues
- (5) Perfect hæmostasis
- (6) Avoidance of tension
- (7) Close apposition of the graft to the recipient area
- (8) Sutures
  - (a) deep fine catgut
  - (b) subcuticular in ear face, eyelids
  - (c) skin fine silkwormgut

**Post-operative management**

- (1) closed dressings
- (2) open method

**(1) SKIN-GRAFTS**

- Ind.
  - (1) Large burn ulcers
  - (2) Large chronic ulcers
  - (3) Extensive wounds
  - (4) Excisional defects

**(A) RAZOR GRAFTS**

- (1) Thiersch's Epidermic Graft
- (2) Intermediate Graft

Sites      Thigh    outer aspect  
                  arm    inner aspect  
                  abdomen lateral aspect

Depth    dead white tissue with punctiform  
                  bleeding points

Tech    two stage

**(A) Donor area**

- (a) preparation    wash with saline  
                                  ↓  
                                  methylated spirit  
                                  ↓  
                                  alcohol

**(b) Cutting the graft**

- (1) keep the razor wet or paraffined
- (2) tension on the region by wood strips
- (3) sawing movements parallel to surface

- (c) preservation of the graft in warm saline
- (d) dressings sterilized vaseline

(B) Recipient area

- (a) removal of granulations
- (b) wash with warm saline
- (c) spread out the grafts overlapping margins

- Dressings
- (1) open gauze with vaseline + 1 % balsam of peru
  - ↓
  - (2) gauze with flavine and paraffin
  - ↓
  - (3) sterilized rubber sponge
  - ↓
  - (4) adhesive straps or crepe bandage
  - ↓
  - (5) splinting

After-treatment

- (1) Closed period ten days
- ↓ leave alone
- (2) Change period one week to fortnight
- ↓ dressings every two days
- (3) Grease massage after healing
- massage by liquid paraffin

Special area for Thiersch

- (1) Eyes
  - (a) ectropion
  - (b) symblepharon
  - (c) socket
- (2) Nose
  - (a) syphilitic destruction
  - (b) atresia
- (3) Mouth
  - (a) lip ectropion
  - (b) soft tissue trismus
  - (c) flat lip
- (4) Extremities
  - (a) Traumatic scars
  - (b) Burns
  - (c) Dupuytren's contracture
- (5) General
  - (a) any skin area
  - (b) stenosis of duct
  - (c) urethral defects

(B) PINCH GRAFTS REVERDIN'S OR DAVIS

- Ind
- (a) very large granulating areas
  - (b) fixation and immobilization not dependable
  - (c) cosmetic appearance not important

- Tech (a) pick up pinches of skin with needles  
 (b) snip off with scissors or scalpel  
 (c) place half an inch from one another  
 (d) removal of granulation not required

Dressings as in Thiersch

### (C) WHOLE THICKNESS GRAFTS WOLFE-KRAUSE

Whole skin down to but not including the subcutaneous fat

- (a) non-hairy  
 (b) hairy

Tech (A) Recipient

- (a) free excision of the area  
 (b) perfect haemostasis  
 (c) determine the size and pattern of the defect

(B) Donor

- (a) cut the graft precisely equal to the recipient  
 (b) snip off the subcutaneous tissues  
 (c) close the raw area by  
     (1) sutures  
     or  
     (2) Thiersch

(C) Transfer place the graft on recipient area and suture the edges

Dress : Same as in other grafts

Pressure dressings Sterile rubber sponge with elastoplast

Splinting of adjoining joints

Change after seven days

Complications of skin-grafts

- (a) Sepsis and suppuration  
 (b) Death of the grafts  
 (c) Displacement of the grafts by  
     (1) friction  
     (2) movements  
     (3) rough dressings  
 (d) Failure of grafts to take

### (2) SKIN FLAPS PEDICLED GRAFTS composed of skin and subcutaneous tissues

- Parts (1) Circulatory Base  
 (2) Plastic

Varieties (1) Advancement or sliding flap

Tech Approximation of undermined edges  
 Ind Scalp breast, moles

(2) Rotation flap

Tech Rotation with broad base

(3) **Transposed flap**

Tech Long axis of the flap at right angles to the long axis of the defect

Ind mouth and cheek

(4) **Bridged or Pedicled flap**

Ind Nose, cheek, face

Variet (a) ordinary pedicled  
(b) arterial pedicled  
(c) tubed pedicled Gillies

Indications (1) Burns or extensive raw surface on face

(2) Distant flaps

Tech (1) First stage

(a) Raise skin strip 3 inches broad with both ends attached

(b) Appose the lateral edges of the strip

(2) Second stage 3 weeks later

(a) separation of lower end

(b) transfer to upper level

(3) Third stage 3 weeks later

(a) separation of the upper end

(b) suture to the margins of the defect

(4) Final stage 3 weeks later

(a) separation of the lower end

(b) suture to the remaining margin

Essentials (1) good circulation

(2) good approximation

(3) no buttonholing

(4) no tension (a) flap larger than recipient  
(b) use of tension sutures

(5) asepsis

## IMPORTANT POINTS

### (1) Trauma

(A) Difference between contusion and haematoma

(B) Wounds

(a) Punctured wounds are most dangerous

(b) Treatment of a puncture is immediate expression of blood

(c) Medico-legal aspect of blunt scalp injuries which resemble incised wounds

(d) Chief considerations about a wound

(a) Is it aseptic?

(b) Is it potentially septic?

(c) Is it frankly septic?

- (e) Treatment of wounds
  - (1) Aseptic disinfection and closure
  - (2) Potentially septic Debridement and closure with temporary drainage
  - (3) Septic Debridement and mag. sulph pack with drainage
  - (4) Established sepsis Carrel Dakin
- (f) Cod liver oil treatment of wounds
  - Ind (1) fresh wounds
  - (2) burns of second and third degrees
  - (3) granulating wounds
- (g) Frequent dressings of granulating wounds delay and prevent healing
- (2) **Staphylococcal infections of the skin and subcutaneous tissues**
  - (a) Sulphanilamide group of drugs have definite value in strepto and staphylococcal diseases of the skin
  - (b) Staphylococcal toxoid is very good in recurrent and resistant furunculosis, styes and carbuncles
  - (c) Never incise a boil never squeeze it
  - (d) Signs of carbuncle
    - (a) diffuse induration
    - (b) induration with multiple softening
    - (r) induration with sieve-like openings
  - (e) Greatest dangers of carbuncle
    - (a) Coma
    - (b) Pyæmia
  - (f) In carbuncle examine every urine specimen
    - (a) sudden disappearance of sugar from urine
      - (1) ? Hypoglycæmia
      - (2) ? Acetonuria
    - (b) Look for Acetone every day
- (3) **Streptococcal infections of the skin**
  - (a) Wide-spread inflammation of skin and subcutaneous tissues
    - ? Erysipelas
    - ? Lymphangitis
    - ? Cellulitis
    - ? Deep acute abscess
    - ? Irritant applications
    - ? Insect bites
  - (b) Erysipelas
    - (1) Erysipelas in new born is insidious, starts in infraumbilical region and is invariably fatal

- (2) Prognosis is worst under 4 months and over 60 years
- (3) Condition of liver is a potent factor in prognosis
- (4) Erysipelas of the face has better prognosis
- (5) Erysipelas of the head is commoner than all other positions put together
- (6) Lupus patients show increased susceptibility to erysipelas
- (c) Main causes of Retroperitoneal cellulitis
  - (1) Extraperitoneal perforations
  - (2) Acute pancreatitis
  - (3) Retroperitoneal appendicitis
  - (4) Extravasation of urine
- (d) Main causes of Pelvic cellulitis
  - (1) Extravasation of urine
  - (2) Genital tears
- (e) Roberts treatment of cellulitis
  - (a) Adhesive elastic bandage applied so as to cover generously the part involved limb being encircled completely
  - (b) Splint or sling for 4-7 days
  - (c) Palpation of the part through the bandage
  - (d) If no pain or fluctuation bandage left on for one week more
- (f) Ideal dressings for all forms of tissue sepsis is undoubtedly the adhesive elastic bandage
- (4) Irritation of the Skin
  - (a) Emollient and chemical treatment of surrounding skin in irritant discharges
    - (1) Salivary fistula
    - (2) Gastric fistula
    - (3) Duodenal fistula
    - (4) Intestinal fistula
    - (5) Biliary fistula
    - (6) Urinary fistula
    - (7) Acid irritating pus
  - (b) Do not use Cyanide gauze with iodine paint  
Do not paint iodine to the scrotum
- (5) Sepsis
  - (a) Sepsis scalp or face Intracranial complications
  - (b) Sepsis throat or neck : Edema of the glottis
- (6) Burns
  - (a) Wilson's clinical phases of burns
    - (1) Initial shock Nervous
    - (2) Secondary shock Blood Concentration
    - (3) Acute toxemia Non-specific toxins

- (4) Septic toxæmia    Bacterial toxins
- (5) Healing
- (b) Treatment of
  - (1) Initial shock    Morphia and heat
  - (2) Secondary shock
    - (a) Local coagulation treatment
    - (b) Intravenous saline with glucose or blood plasma
    - (c) Eucortone (Allen & Hanbury) 2 c.ca. every hour
- (c) Coagulation treatment    Tannic acid 2.5 - 10 % sol.
  - (1) Davidson
    - (a) paint
    - (b) pack
    - (c) spray
    - (d) bath    (Well)
  - (2) Bettman    Tannic acid + Silver nitrate
  - (3) Coan (a)    Paint of Tr Ferri perchlor
    - (b) Spray of
 

Tr Ferri perchlor	15 parts
Sodii Hydroxide	3    "
Aqua Dist.	30
- (d) Antiseptics used with Tannic acid treatment
  - (1) Acriflavine 1-1000
  - (2) Triple dye
 

gentian violet	10%
brilliant green	1 in 2000
acriflavine	1 in 1000
  - (3) Dettol    20% (Cruickshank)
  - (4) Mercury Perchloride    1 in 2000
- (e) Other treatments of Burns
  - (1) Turner    2% aqueous sol. of mercurochrome
  - (2) Lohr    Lint soaked in cod liver oil
  - (3) Normal Horse Serum sprays twice daily
- (f) Tannic acid should not be used if fat is exposed as no tanning takes place
- (g) Do not use tannic acid on hands and fingers  
Protect eyes in tannic acid treatment of facial burns.
- (h) 5% tannic acid
 

{	(a) 5 teaspoonfuls of tannic acid powder to a glassful of water
	(b) 220 gra. to 10 ounces of water
- (7) Ulcers
  - (a) Ulcer on the face
 

? Lupus
? Rodent
? Epithelioma
? Syphilis
? Leprosy

- (b) Any indolent unhealing ulcer or abrasion on any part of the body especially lips, tongue, breast and fingers Do not forget syphilis
- (c) Small ulcer with a pin point opening in the middle near about ankle joint  
? Guinea worm
- (d) Treatment of ulcers
  - (1) Spreading stage Hypertonic dressings
  - (2) Transitional stage Mild antiseptic dressings
  - (3) Healing stage Emollient dressings
  - (4) Non-healing stage
    - (a) Treat the general condition
    - (b) Treat the regional condition
    - (c) Treat the local condition
    - (d) Dressings
      - weak ulcer Scarlet red
      - Proud ulcer Cantharization
- (e) Applications for a pressure sore
  - Zinc oxide or Zinc sulph
  - Scarlet red
  - Silver nitrate
  - Tannic acid
  - Ichthyol
  - Flavine in Castor oil
  - Cod liver oil
- (f) Always look out for bed sores in every debilitated bed ridden or paralytic patient. Prevention is better than cure
- (g) Elastoplast strapping is an ideal treatment for
  - (a) Varicose ulcers
  - (b) Chronic leg ulcers
  - (c) Bed sores
- (h) Ideal treatment of a bed sore is complete covering by two layers of elastoplast, which should be left on till healing is complete
- (i) Lupus \ Ray and Radium give transient benefit and result in disfigurement, telangiectasis irregular pigmentation and ulceration

## (8) Sinuses and Fistulae

- Causes
- (1) Chronic septic focus : bone
  - (2) Specific infection T.B.
  - (3) Distal obstruction Urethral
  - (4) Malignancy
  - (5) Congenital

## (9) New growths

- (a) Infected or self treated warts and corns in elderly people may be a primary focus in



- (1) Diabetic gangrene
- (2) Senile gangrene

Some useful paints for wart & molluscum contagiosum

- (1) Zinc chloride drachm  $\frac{1}{2}$   
Salicylic acid collodion (1 in 10) to oz. 1
- (2) Phenol 10 parts  
Glacial acetic acid 10 parts  
Salicylic acid 10 parts  
Strong Tr Iodine 20 parts  
Industrial spirit to 100 parts

- (b) Melanoma malignum is one of the most malignant tumours

Black streaks and thrombosed veins running up the limb from a small focus on the fingers or toes  
? Melanoma malignum

- (c) Skin carcinoma without gland affection

- (1) Warty epithelioma
- (2) Rodent ulcer
- (3) Marjolin's ulcer (scar carcinoma)

- (d) Treatment of Cancerous and Pre-cancerous derma-  
toses

- (1) Radium
- (2) X Rays
- (3) Diathermy (a) cutting current  
(b) electro-dessication  
(c) electro-coagulation

- (4) Cantery
- (5) Electrolysis
- (6) Carbon dioxide snow
- (7) Curettage
- (8) Surgical excision

- (e) In man exposure to ultra violet light plays an important part in the etiology of carcinoma of the skin

## (10) Filarial Elephantiasis

Bowman's Glycerine treatment

Intra-arterial or Intravenous (Femoral) injections of 2-3 c.c. of 10% sterile glycerine in water once every week

## (11) Scars

- (a) Cheloid ? Is it local or is there a general cheloid diathesis?
- (b) Early massage and mobilization of a scar over the deeper structures is essential to avoid adhesions
- (c) Proper splintage is essential to avoid contractures
- (d) Avoid friction of and tension on a scar for at least six months

**(12) Nails**

- (a) Colour of the nails is important in
  - (1) Blood conditions hæmorrhage, anemia
  - (2) Plasters, bandages, splints cyanosis
  - (3) Anæsthesia cyanosis
  - (4) Chronic respiratory diseases
- (b) Indolent ulcer or paronychia
  - ? Chancre
  - ? Ingrowing toe nail
  - ? Melanotic whitlow
  - ? Leprosy

**(13) Skin-grafting**

- (a) Post-operative treatment principles
  - (1) no irritant dressings
  - (2) absolute fixation with no friction
  - (3) uniform pressure
    - (a) elastoplast
    - (b) crepe bandage
    - (c) rubber sponge  
boiled in saline and squeezed into dry towel  
applied to gauze covered graft with  
elastoplast under slight tension
    - (d) rubber air bags
  - (4) Immediate dressings open mesh non-sticking
  - (5) Delicate change of dressings
  - (6) Splinting
- (b) Dressing methods after skin-grafting
  - (1) Pressure dressings
  - (2) Closed non pressure dressings
  - (3) Semi-closed dressings covering dressings  
not in contact of the area but fixed to  
proximal and distal pads
  - (4) Open dressings cradle
- (c) Treatment stages
  - (1) Closed period one week
  - (2) Change period one week
  - (3) Grease massage period
- (d) (1) Thiersch Treatment of Donor area precedes  
that of Recipient
- (2) Wolfe Treatment of Recipient area precedes  
that of Donor

The treatment of the Recipient and the Donor  
areas must be separate from each other

- (e) Wolfe's grafts are most successful when recipient  
area is backed up by a bone

- (f) Pedicled flaps and Wolfe grafts are unsatisfactory over a granulating surface
  - (g) Use of collodion half on the edge of the Thiersch graft and half on the surrounding skin to keep the graft in place
  - (h) Dressings for the donor area after Thiersch
    - (a) Sterile vaseline or paraffin or Cod liver oil
    - (b) Tannic acid treatment
  - (i) Essentials of successful skin-graft
    - (1) absence of sepsis
    - (2) absence of tension
    - (3) perfect apposition of surfaces
    - (4) absence of friction
  - (j) The dressings in direct contact with Thiersch or Reverdin grafts must be perforated and non-sticky
  - (k) Points to be remembered in Reverdin
    - (1) granulations must be healthy
    - (2) grafts of full thickness in the centre and of not more than 5 cm. in diameter
    - (3) interval of 5 cm. between each graft
    - (4) immobilization and pressure
-

## CHAPTER II

# THE MUSCLES, TENDONS AND APONEUROSSES

## I CONGENITAL

### (1) ABSENCE

- (a) Pectoralis in association with amastia
- (b) Shoulder muscles Sprengel's shoulder

### (2) MYOBLASTOSIS

Path Congenital arrest of development → fibrosis, ossification or fatty degeneration of muscles

Considered to be primary cause of many congenital deformities such as

- (a) Congenital tibial kyphosis
- (b) Sprengel's shoulder
- (c) Myodystrophia foetalis deformans

## II TRAUMA

### (I) CONTUSION

- |           |  |
|-----------|--|
| Etiology  | strains and blows                            |
| Clinic    | (a) painful function                         |
|           | (b) irregular tremors                        |
|           | (c) effusional swelling                      |
| Diff diag | (a) sprain of a joint                        |
|           | (b) subcutaneous contusion                   |
| Compl     | (a) blood borne suppuration                  |
|           | (b) fibrotic adhesions                       |
|           | (c) pathological rupture (fraying of tendon) |
| Treat     | (a) relaxation + cold applications           |
|           | ↓  |
|           | (b) massage and movements                    |

### (II) RUPTURE

- |          |                  |  |
|----------|------------------|--|
| Etiology | (A) Traumatic    | (a) strain                                     |
|          |                  | (b) open wounds                                |
|          |                  | (c) fractures and dislocations                 |
|          | (B) Pathological | Osteoarthritis                                 |
|          |                  | Tuberculosis                                   |
| Sites    | (a)              | junction of the belly and the tendon           |
|          | (b)              | avulsion of the tendon with its bony insertion |
|          | (c)              | avulsion of the tendon from its bony insertion |
|          | (d)              | avulsion of the origin                         |

Clinic	(a)	sudden painful rupture
	(b)	loss of function
	(c)	two swellings with an intervening gap
Compl	(a)	fibrosis with
	(1)	passive stretching
	(2)	contracture
	(3)	adhesions
	(b)	myositis ossificans
Sequelæ	(a)	painful function
	(b)	loss of function

### *Muscles affected*

#### (1) STERNOMASTOID

Etio	birth injuries
Clinic	local discolouration and effusion
Compl	sternomastoid tumour → torticollis
Treat	rest and cold applications

#### (2) SUPRASPINATOUS

	(A)	Acute traumatic rupture
Etio		falls on outstretched hand
		dislocation shoulder
Clinic	(a)	active abduction lost
	(b)	passive abduction painless
	(c)	tenderness over greater tuberosity
Treat		Suture or fixation of the avulsed tendon to the tuberosity by fascial graft
Tech	(1)	incision over the shoulder top
	(2)	division of acromion
	(3)	exposure of the joint
	(B)	Chronic friction tendinitis
Etio		Shoulder labourers
Clinic	(a)	local tenderness
	(b)	painful abduction between 60 — 120°
Treat	(a)	Leriche local injection of 10—20 c.c.s. of 20% novocain
	(b)	Diathermy
	(C)	Tendon calcification
Etio		chronic osteoarthritis shoulder
Clinic		painful abduction
Diag		X Ray
Treat	(a)	Physiotherapy
	(b)	Leriche novocain injection
	(c)	Excision

#### (3) BICEPS BRACHII LONG HEAD

Etio	(a)	trauma heavy weights falling objects
	(b)	pathological osteoarthritis shoulder

Sites	(a) intra-articular
	(b) tendo-muscular junction
Clinic	(a) painful and weak flexion and supination
	(b) on flexion of the forearm
	(1) soft swelling just above the elbow
	(2) hollow in front of upper arm
Treat	Operative suture
	Tech Incision over ant. 1/3rd of deltoid
	Exposure of bicipital groove
	Suture of long head to short head, or
	To Humerus in Bicipital groove
After treat	Fixation
Method	Plaster of Paris
Position	Arm adduction
	Forearm across the chest
Time	6 weeks

**(4) TENNIS ELBOW** Common extensor origin or deep head of pronator

Def Pain and tenderness below the external humeral epicondyle, unaccompanied by any joint abnormality in tennis players

Etio **Top Spin** pronation

Path (a) tears of extensor origin or deep head of pronator

(b) periostitis traumatic

(c) trauma to radiohumeral ligament

(d) bursitis traumatic

Clinic (a) painful inability to pronate and extend the forearm

(b) Tenderness

(a) antecubital

(b) below the external humeral epicondyle

Diag Pain in the area on palmar flexion of tight fist with elbow in extension relieved by dorsiflexion

Treat (1) Preventive

(a) stop the game

(b) treat any septic focus

(2) Conservative

(a) Rest (a) cock up splint

(b) elastic strapping

(b) Diathermy

(c) Faradism

(3) Manipulative

Ind (a) patient anxious to resume game

(b) impediment to full extension



**Treat (1) Conservative Fixation**

Method (a) plaster of Paris

(b) light malleable splint

Extent web to tip

Position (A) **TERMINAL SLIP**

Terminal joint hyperextension

Proximal joint flexion

(B) **MIDDLE SLIP**

Terminal joint flexion

Proximal joint extension

Time 6 weeks

**(2) Operative**

Ind (1) Rupture tendon with unreduced dislocation

(2) Non united tendon with painful finger

Tech (1) Immediate open suture

(2) **Arthrodesis** of the phalangeal joint**(7) RECTUS ABDOMINIS**

Etio (A) Trauma Heavy weight lift, parturition, blows

(B) Pathological tetanus, strychnine poisoning

Clinic Painful contractions

Gap with two swellings

**(8) QUADRICEPS EXTENSOR (See under the knee joint)****(9) ADDUCTORS OF THE THIGH**

Etio Riding jumping swimming

Clinic Snap with painful inability to adduct

Compl Myositis ossificans

**(10) TENNIS LEG Gastrocnemius and plantaris**

Etio sudden dorsiflexion of the foot

Path (a) partial rupture of inner head of gastrocnemius

+

(b) rupture of plantaris three inches below knee

Clinic (a) severe sudden painful snap

(b) painful inability to plantarflex

Treat rest with strapping

**(11) GASTROCNEMIUS**

Etio Sudden dorsiflexion of the foot

Path Rupture at the lower end of the belly

Clinic (a) sudden painful snap

(b) local bruise and tenderness

(c) painful inability to plantarflex

Treat complete rest with strapping in plantarflexion



**(12) TENDO ACHILLIS**

- Etio** (a) sudden severe dorsiflexion of the foot  
 (b) falls from height  
 (c) fracture dislocation of the ankle
- Path** rupture at (a) 1.5 inches above the insertion  
 (b) musculo-tendinous junction
- Clinic** (a) painful inability of plantarflexion  
 (b) abnormal passive dorsiflexion  
 (c) local palpation : bruise, tenderness, gap
- Treat** (1) **Conservative** fixation  
       Method : plaster of Paris  
       Extent : knee to toes  
       Position : full equinus  
       Time : eight weeks
- (2) **Operative**  
       (1) Trimming and suturing  
       (2) Tendon lengthening and suturing
- After treat** (a) fixation  
       Method : plaster of Paris  
       Extent : knee to toes  
       Position : foot at right angles  
       Time : ten weeks
- (b) **Walking stirrup** at the end of two weeks

*General treatment of rupture***(A) PARTIAL RUPTURE**

- (1) Postural relaxation + cold applications  
       ↓       Method : splint or plaster bed  
       Time : ten days
- (2) Firm elastic bandaging with massage and protected use

**(B) COMPLETE RUPTURE**

- (1) **Conservative**  
       (1) Postural relaxation  
           ↓       Method : splint or plaster  
           Time : 8-10 weeks
- (2) Elastic bandage : massage, movements
- (2) **Operative**  
       (a) Suture with chromicized catgut  
       ↓  
       (b) Postural relaxation for 8-10 weeks  
       ↓  
       (c) Massage and movements

**(C) OLD RUPTURE**

- (1) Tendon transplantation  
 (2) Artificial silk or fascial tendon

**(III) LUXATION OF TENDON**

Etiol	(a) Predisposers
	(1) anatomical angular course (2) pathological (a) deformities (b) weakness of retentive ligaments
	(b) Exciting strain
Sites	(1) wrist extensors of the thumb and index
	(2) ankle peronei tibials anterior & posterior
	(3) shoulder long head of the biceps
	(4) hip gluteus maximus (snapping hip)
	(5) neck splenius capitis
Clinic	(1) sudden painful weakness
	(2) locking with painful movements
	(3) palpation tendon in abnormal position
Treat	(1) Reduction under anaesthesia
	↓
	(2) Fixation
	Method splint or plaster Position of relaxation of the tendon Time eight weeks
Compl	(1) Recurrence
	Treat operative
	(a) grooving the bone
	(b) suture of retentive ligaments
	(2) functional disability
	(3) tenosynovitis
	(4) pathological rupture

**(IV) HERNIA OF A MUSCLE**

Def	Protrusion of a muscle belly through a defect in its sheath
Etiol	(1) Congenital
	(2) Traumatic
Sites	(1) Biceps brachii
	(2) Adductors of the thigh
Clinic	Soft localized lump on contraction disappearing on
	(a) passive extension
	(b) opposed contraction
Diff. diag	(1) Rupture of muscle
	(2) Intermuscular cyst or new growth
Treat	Closure of the hiatus in the muscle sheath by
	(a) catgut
	(b) fascial darning

## II INFLAMMATION OF MUSCLES, TENDONS AND APONEUROSSES

### (I) MYOSITIS

#### (A) ACUTE MYOSITIS

Etiology	(1) <b>Acute suppurative myositis</b>
	(a) extension from a neighbouring focus
	(b) local septic injections
	(c) pyæmic
	(2) <b>Acute Rheumatic myositis</b>
Association with	
(a) fibrositis	
(b) arthritis	
	(3) <b>Acute Gonorrheal myositis</b>
	(a) myalgia
	(b) fibrosis
	(4) <b>Polymyositis non-suppurative</b>
	Etiology (a) intestinal toxins
	(b) focal toxins tonsils
	(c) neuro-myositis
	(5) <b>Gas gangrene</b> (See under gangrene)
Clinic	(1) Pain tenderness and swelling of the muscle
	(2) Induration and contraction of the muscle
	(3) Painful (a) active contraction
	(b) passive extension
	(4) Fixation of the limb in position of muscular action
Treat	(1) <b>Local</b>
	(a) rest in relaxation + warmth
	↓
	(b) massage + rubefacients
	↓
	(c) physiotherapy and electrotherapy
	(2) <b>Focal</b> treatment of focal sepsis tonsils
	(3) <b>Symptomatic</b> Quinine Salicylates
	(4) <b>Operative</b>
	Ind (a) suppuration incision and drainage
	(b) gas gangrene excision amputation

#### (B) CHRONIC MYOSITIS

##### (1) TUBERCULOUS MYOSITIS

Etiology	Extension from a neighbouring focus
Path	(1) local tuberculoma
	(2) tuberculous infiltration

- (3) cold abscess  
 (4) fistulae
- Clinic any intramuscular swelling in a tuberculous patient
- Diff diag (1) Lipoma intermuscular  
 (2) Gumma  
 (3) Cyst  
 (4) Pseudo-hernia

## (2) SYPHILITIC MYOSITIS

Varieties (A) Myalgia

(B) Diffuse gummatous infiltration

(C) Localized muscular gumma

Site Calf abdominal wall sternomastoid

Clinic (1) intramuscular indolent induration



(2) sub-acute inflammatory induration



(3) sub-acute abscess



(4) gummatous ulcer

Clinic Any intramuscular swelling in a syphilitic patient

## (3) ACTINOMYCOSIS AND GLANDERS MYOSITIS

### (C) EPIDEMIC MYALGIA OR PLEURODYNIA

Path sudden painful spasm at the diaphragmatic attachment to the chest wall

Clinic (a) sudden onset

(b) acute symptoms pain + tenderness + spasm

(a) Thoracic respiratory pain

(b) Abdominal

Diff. diag (1) Thoracic pleurisy pneumonia

(2) Acute abdomen appendicitis

Treat (1) Local rest + warmth + rubefacients

(2) General salicylates

### (II) TENOSYNOVITIS

#### (A) ACUTE TENOSYNOVITIS

Eti (1) Acute Traumatic tenosynovitis  
 acute strain, contusions, rupture

(2) Acute Infective tenosynovitis

septic wounds

whitlows and boils

blood borne pyæmia

(3) Acute Rheumatic tenosynovitis

in 2nd or 3rd week of acute rheumatism—

tendons of wrist and ankle

Clinic	(4)	<b>Acute Gonococcal tenosynovitis :</b>	
	(1)	painful active movements and passive stretching	
	(2)	spasm with abnormal posture	
	(3)	frictional creaking	
	↓		
Compl	(4)	discrete tender swelling along the tendon	
	↓		
	(5)	diffuse swelling (tendo-cellulitis)	
	(1)	adhesions	
	(2)	contractures	
Treat	(3)	suppuration	
	(4)	alonging	
	(5)	spread to surrounding structures	
	(1)	<b>Conservative</b>	Rest in relaxation Heat + rubefacients + Bier
	(2)	<b>Suppuration</b>	Incision and evacuation of pus Antiseptic baths and irrigations
	(3)	<b>After-treatment</b>	Early massage and movements

## (B) CHRONIC TENOSYNOVITIS

Path. varieties	(1)	serous effusion
	(2)	adhesive peritendinous adhesions
	(3)	formative nodules
	(4)	fungus papillomatous fringes
	(5)	fibrofatty
	(6)	necrosing pathological rupture

### Clinical varieties

#### (1) chronic traumatic tenosynovitis

(a) serous

(b) adhesive

(c) stenosing tendovaginitis

Etio occupational strain of thumb  
charwomen

Path fibrous thickening of the sheath of

(a) abductor pollicis long

(b) extensor pollicis brevis

Clinic Tender thickening just above the radial  
styloid

Treat Division of thickened sheaths

(d) peritendinous fibrosis

Etio trauma to the hand

Site extensor of the hand

Clinic circumscribed hard swelling  
on the dorsum of the hand

Treat dorsal plaster cast

- (2) Osteoarthritic tenosynovitis necrosing
- (3) Gouty tenosynovitis formative
- (4) Gonorrheal tenosynovitis adhesive
- (5) Syphilitic tenosynovitis
  - (a) Serous symmetrical painless, indolent
  - (b) Gumma local
  - (c) Infiltrating gummatous peritendinitis with indurated serpiginous ulcer
- (6) Tuberculous tenosynovitis

**Clinic (a) Fungus**

(a) soft pulpy swellings



(β) multiple softenings



(γ) sinuses and granulations

(b) Serous effusion with malon seeds  
soft painless fluctuating linear  
swelling along the tendon

(c) associated features

(a) age 18-35

(β) painless, insidious onset

(γ) muscular wasting marked

**Sites** (a) flexors of wrist compound palmar ganglion  
(b) peronei and extensors secondary to TB  
Tarsus

**Treat (a) Conservative**

(a) Rest in relaxation by splints or plasters  
+

(β) Rubefacients and Bier

(b) Operative

(a) Scraping and B L P P

(b) Excision

## (III) APONEUROSITIS

### (A) Acute aponeurosis

**Etio** (1) Gonorrheal

(2) Influenzal

(3) Rheumatic

(4) Infective tonsillitis

(5) Traumatic acute strain

(6) Gouty

### (B) CHRONIC APONEUROSITIS

**Etio** (1) Sequela to all acute varieties

(2) Postural strain + sprain

Clinic	(1) Pain + tenderness + spasm
	(2) Fixed posture
	(3) Painful movements and passive stretching
Clinical entities	(1) Lumbago
	(2) Torticollis
	(3) Acute spasmodic valgus
Compl	(1) Deformities
	(2) Contractures
	(3) Invalidism
Treat	(1) Treat the etiology
	(2) Local Rest in relaxation
	Heat rubefacients, Bier
	Physio and electro therapy

### III MYOSITIS FIBROSA

Contractures of muscles and aponeuroses

#### (I) CONGENITAL TORTICOLLIS

Etio Difficult labour with breech presentation

Path Local contusion



Rupture and thrombosis of veins



Obstruction to venous return



Fibrosis and contracture of the muscle

Clinic	(1) Sternomastoid tumour
	firm, spindle shaped swelling in the lower half of sternomastoid three weeks after birth
	↓
	(2) Torticollis
	(a) posture head flexed
	bent to same side
	rotated to other side
	(b) compensatory scoliosis of cervical spine
	(c) local palpable ribbon-like muscle
	(d) associated homolateral hemiatrophy of the face
Treat	(1) Manipulative
	(2) Manipulations + Retention in plaster
	(3) Tenotomy
	(a) closed
	(b) open
	After treat immobilization
	Method sand bags
	Position corrected
	Time fortnight

(4) **Lengthening of sternomastoid**

After treat    Immobilization  
                   Method    plaster collar  
                   Position   corrected  
                   Time     4-6 weeks

After treat    Physiotherapy active and passive movements

**(II) VOLKMANN'S ISCHÆMIC CONTRACTURE**

Def    flexion of fingers and wrist  
          +  
          partial paralysis of forearm flexors  
          due to myositis fibrosa caused by injuries round  
          about the elbow joint

Etiology    age 6-11 years

(1) **Fracture and dislocation elbow**

- (a) separated humeral epiphysis
- (b) supra-condylar fracture
- (c) fracture radius and ulna

(2) **Brachial artery**

- (a) rupture
- (b) thrombosis
- (c) occlusion
- (d) endarteritis
- (e) pressure

(3) **Hæmatoma** in the region of elbow(4) **Faulty bandage** splint plaster malposition(5) **Damage to nerves**(6) **Spontaneous hæmophilia**

Path (A) **Circulatory theory**

(1) **Arterial ischæmia**

+

(2) **Venous obstruction**

↓

(3) **Venous congestion and thrombosis**

↓

(4) **Degeneration and leucocytic infiltration**

↓

(5) **Fibrosis**

↓

(6) **Contracture with partial paralysis**(B) **Sympathetic theory**

Periarterial sympathetic excitation



- Clinic** (A) **Acute stage**
- (1) Pain, cyanosis and cedema of fingers
  - +
  - (2) Diminished radial pulse
  - +
  - (3) Indurated and swollen flexor muscles
- (B) **Paralysis stage**
- (1) Partial paralysis and contracture of flexors and pronators
  - (2) Extensors and supinators normal
- Diagnosis** (1) **Complication of elbow injury**
- (2) Fingers extended when wrist is flexed
  - Fingers flexed when wrist is extended
- Diff. diag** (1) Ulnar nerve paralysis
- (2) Radial nerve paralysis
  - (3) Median nerve paralysis
  - (4) Cerebral monoplegia
  - (5) Skin or cellular contracture
  - (6) Flexion ankylosis of wrist
- Association** One or more nerve palsies
- Treat** (A) **Prophylactic**
- (1) *immediate accurate fracture reduction*
  - (2) *examination after 12 hours after treatment of every elbow injury*
  - (3) *avoid pressure round about an injured elbow*
  - (4) *avoid acute flexion of an injured elbow*
- (B) **Acute phase within 48 hours of onset**
- Ind** (a) *intense and increasing pain*
- (b) *feeble radial pulse*
- (c) *blue and swollen arm*
- Tech** (1) *Place the arm on a pillow with*
- ↓ *elbow at 120 degrees*
- (2) *Removal of the blood clot by*
- + *incision*
- (3) *Periarterial sympathectomy*
- (C) **Chronic phase partial paralysis with contracture**
- (1) **Mechanical**
    - (a) *physiotherapy*
    - (b) *Robert Jones retentive splints on the dorsal aspects of fingers*  
→ hand → wrist → forearm
  - (2) **Operative:**
    - (a) *Max page: muscle sliding*

- (b) **Hamilton Bailey:** Sliding of median epicondyle with its attached muscles
- (c) **Tendon lengthening**  
Flexor Carp. Rad.  
Flexor Carp. Uln.  
Flexor Poll. Long
- (d) **Sub-periosteal excision** of both bones
- (e) **Arthrodesis** wrist after excision of carpal
- (f) **Neurolysis**

**After-treat** physiotherapy electrotherapy  
passive and active movements  
retentive apparatus

## (II) DUPUYTREN'S CONTRACTURE

**Def** Bilateral asymmetrical flexion deformity of ring and little fingers due to chronic inflammatory contracture of palmar fascia


**Etio** (1) men  
(2) middle age  
(3) chronic rheumatism and gout

**Path** Changes in palmar fascia and its longitudinal process  
Chronic plastic inflammation → Induration  
→ Contracture

**Clinic** (a) nodular tender thickening at the palmar aspect of the root of the ring finger  
(b) ring finger flexion of the proximal two joints  
(c) little finger flexion of the proximal joints

**Diff. diag** (a) Tenosynovitis  
(b) Congenital contracture of little finger

**Treat** (1) **Conservative:**  
(a) physiotherapy and electrotherapy  
(b) fibrolysis  
(c) stretching and retentive splints  
(d) X Rays and radium

(2) **Operative:**  
(a) **Fasciotomy:** nicking and stretching the bands  
(b) **Excision of the fascia**  
through a  incision

- (c) Excision of the skin and fascia with skin-grafting
- (d) Excision of the head of the first phalanx

Post. Compl (a) : hæmatoma and suppuration  
 (b) sloughing of skin  
 (c) recurrence

## IV MYOSITIS OSSIFICANS

### (I) MYOSITIS OSSIFICANS PROGRESSIVA

Def Generalized and progressive deposition of calcium and bone in muscles, aponeuroses, ligaments and fasciæ

Etio Sex male  
 Age children young adults  
 Sites muscles of the back spine, thorax

Clinic (1) Bony deposition in sheets  
 (2) Poker man  
 (3) Congenital abnormality of great toe

Compl : Respiratory infection

Treat Parathyroid extract

### (II) MYOSITIS OSSIFICANS TRAUMATICA

Etio Causes (a) contusions periosteal  
 (b) fractures and dislocations  
 (c) overzealous mobile treatment  
 (d) occupations, frictions & stresses

Time 5-8 weeks after trauma

Path (1) Hæmatoma or periosteal laceration



(2) Calcification



(3) Ossification between and along muscle fibres

Sites (1) Suprapatellar : Quadriceps avulsion  
 (2) Ankle joint avulsion of anterior ligament from neck of astragalus  
 (3) Knee joint avulsion of internal lateral ligament from internal condyle  
 (4) Shoulder joint avulsion of acromioclavicular conoid and trapezoid ligaments in clavicular dislocations  
 (5) Elbow joint  
 (a) avulsion of brachialis from ulna  
 (b) avulsion of forearm muscles from condyles  
 (c) disinsertion of biceps  
 (6) Adductor Adductors of the thigh in riders

- Clinic (1) History and site  
 (2) Mechanical disability  
 (3) Palpation  
 (4) \ Rays cloudy or dense shadow
- Treat (1) Complete rest for six months  
 (a) no massage and passive stretchings  
 (b) active exercises allowed  
 (2) Excision of the bone after one year  
 (3) Parathyroid extract

### (III) FALSE EXOSTOSES

Local ossifications in muscles, tendons, ligaments . in

- (a) Osteoarthritis  
 (b) Neuropathic Arthropathy

## V TUMOURS OF THE MUSCLES, TENDONS AND APONEUROSSES

### (A) TUMOURS OF THE MUSCLES

#### (1) CAVERNOUS ANGIOMA

- Site lower extremity triceps  
 Clinic compressible pulsating thrill and murmur

#### (2) LYMPHANGIOMA

#### (3) LIPOMA intermuscular

- Site shoulder thigh abdominal wall  
 Clinic relaxed muscle soft, fluctuating } swelling  
 contracted muscle firm hard }

- Diff. diag (a) Cold abscess  
 (b) Gumma  
 (c) Cysts  
 (d) Other growths angioma fibroma

#### (4) FIBROMA DESMOID TUMOUR OF ABDOMINAL WALL

- Eto Sex and age women between 20 and 40  
 Predis (1) Lineae albicantes (parturition)  
 (2) Trauma
- Path Fibroma from muscle sheath or fibrous tissue
- Clinic (a) slow growth  
 (b) local infiltration no capsule  
 (c) adhesion to skin and bone  
 (d) recurrence after removal

Treat Excision



Radium

**(5) SARCOMA**

- Sites tongue calf muscles  
 Path fibrosarcoma from muscle sheaths  
 Clinic (1) firm circumscribed indolent, painful, slightly mobile growth along the length of the muscles with  
     (a) progressive growth in size  
     (b) signs of vascularity  
     (2) X Ray pressure changes in underlying bone  
 Diff. diag (a) Bone sarcoma  
             (b) Gumma  
             (c) Innocent growths  
             (d) Aneurysms  
 Treat (1) Local excision of the whole muscle  
         (2) Amputation  
         (3) Radium, X Rays

**(6) MYOMA**

- (A) Rhabdomyomata Bladder Vagina, Heart  
 (B) Leiomyomata Uterus, Oesophagus, Stomach Ovary

**(7) CARCINOMA**

Secondary by extension muscles of the chest

**(B) TUMOURS OF THE TENDONS****(1) GANGLION**

- Def Cystic swelling in connection with a tendon sheath, in the neighbourhood of a joint  
 Path (a) Synovial herniation  
         (b) Colloid or mucoid degeneration of tendon sheath  
         (c) Lymphangioma  
         Contains gelatinous glairy fluid  
 Sites Dorsum wrist ankle, knee  
 Clinic Globular fluctuating or hard small swelling along the course of a tendon and related to it  
 Diff. diag (a) adventitious or anatomical bursitis  
             (b) sebaceous cyst  
             (c) encapsulated lipoma  
             (d) cold abscess  
 Treat (1) Subcutaneous rupture + tight bandage  
         (2) Aspiration + Injection + tight bandage  
             (a) collodion  
             (b) 0.5-2 c.c. of 5% sod. morrhuate  
         (3) Evacuation through a puncture + tight bandage  
         (4) Excision with closure of hiatus in tendon sheath or joint

**(2) GIANT CELLED TUMOURS**

- (3) **CHONDROMA** Myxochondroma  
 (4) **TENOSYNOVIOMA** Xanthoma Foam cells  
     (a) innocent  
     (b) malignant

- (5) **HÆMANGIOMA**  
 (6) **FIBROMA**  
 (7) **SARCOMA**  
 (8) **ENDOTHELIOMA**

**(C) TUMOURS OF THE APONEUROSSES**

- (1) **FIBROMA**  
 (2) **SARCOMA**  
 (3) **CHONDROMA**  
 (4) **OSTEOMA**

**VI OPERATIONS ON MUSCLES, TENDONS  
AND FASCIÆ**

**(I) TENOTOMY** Division of a tendon

- Ind (1) **Contractures** Dupuytren  
     (2) **Spasms** spastic paraplegia  
     (3) **Deformities** Talipes equinus  
     (4) **Preliminary** to other procedures on tendons  
     (5) **Pressure syndrome** Scalenus anticus  
 Tech (1) **Subcutaneous** tenotomy knife  
     (2) **Open**

**SPECIAL TENOTOMIES AND MYOTOMIES**

**(1) STERNOMASTOID**

Ind **Torticollis**

- Site (a) high mastoid insertion  
     (b) low near clavicle  
     (c) middle in tendon lengthening

- Tech (A) **Open** vertical incision  
     Contraind (a) absent muscle line  
               (b) scar prominent

(B) **Subcutaneous**

- (a) Rt. side division from inner to outer side  
     (b) Left side division from outer to inner side

After treat complete rest for 4 days  
 massage, stretchings and exercises  
 no plaster fixation

**(2) FLEXION DEFORMITY OF HIP****(in Infantile Paralysis)**

- Tech** (A) Subcutaneous in mild cases  
 (a) Pass a tenotome below ant. sup. iliac spine  
 (b) Cut inwards  
 (B) Open in severe cases  
 (a) Incise along anterior third of iliac crest and outer border of scarpa  
 (b) Detach origins of the muscles

- After-treat** Correction of deformity by  
 (a) Forcible correction  
 (beware of fracture femoral neck)  
 ↓ Plaster of Paris  
 (b) Weight extension in adducted position

**Muscles cut** Sartorius, Tensor fasciae femoris, Gluteus med.  
 Rect femoris, Iliopsoas Anterior capsule

**(3) TENOTOMY OF ADDUCTORS OF THE THIGH**

- Ind** (A) Adduction deformity in  
 (a) spastic paralysis  
 (b) arthritis hip  
 (B) Accessory in  
 (a) osteotomy of the femur  
 (b) arthrodesis of the hip  
 (c) reduction of congenital hip dislocation

**Muscles** Adductor Longus, Adductor Brevis, Gracilis

**Method** (a) subcutaneous  
 (b) open

**Site** near origin

**(4) TENOTOMY OF THE HAMSTRINGS**

- Ind** (a) spastic paraplegia  
 (b) flexion ankylosis of the knee

**Muscles** Iliotibial band Biceps femoris  
 Semitendinosus Gracilis

**Method** Open (a) outer over biceps tendon  
 (b) inner over semitendinosus & gracilis

**(5) TENOTOMY OF TENDO ACHILLIS**

**Ind** Talipes Equinus in older childhood to adolescence

**Methods** (A) Subcutaneous

- Ind** (a) adults  
 (b) moderate shortening

**Tech** Cut inner half close to insertion  
 Cut outer half 2 inches higher up  
 Forcible dorsiflexion of the foot

## (B) Open

- Ind (a) children  
 (b) excessive shortening  
 (c) pronounced spasm  
 (d) adhesions

Tech incise parallel and to one side

## (6) TENOTOMY OF TIBIALIS anterior and posterior

Ind Talipes Varus

Method Open

- Tech Divide T post. just above internal malleolus  
 Divide T ant. below annular ligament  
 Avoid artery and other tendons

## (7) TENOTOMY OF THE PERONEI

Ind Spastic talipes valgus

Method open incise vertically above external malleolus

## (8) TENOTOMY OF TOE EXTENSORS

Ind Pes Cavus

Method (A) Subcutaneous 2nd to 5th toes

(B) open great toe

Site over the heads of metatarsals

## (9) TENOTOMY OF PLANTAR FASCIA

Ind Pes Cavus

Method Subcutaneous

- (a) insert tenotome 1 inch in front of os calcis tubercle  
 (b) pass out between skin and plantar fascia  
 (c) cut from without inwards  
 (d) wrench the foot to correction

## (10) STEINDLER'S OPERATION

Def Separation from the under surface of os calcis and sliding forwards the origin of -

Plantar fascia

Short muscles of the sole

Long and short plantar ligaments

Ind (a) Pes Cavus

(b) Talipes equinovarus advanced

Tech (1) Incision

- (a) from the centre of the back of the heel to the level of the mid tarsal joint  
 (b) parallel to and  $\frac{1}{2}$  inches above the outer border



- (c) down to the os calcis
- (2) separation of muscle origins from the bone
- After treat (A) Mobile
- (a) fixation on a flat metal 4 days
- ↓
- (b) daily stretchings 5th day
- ↓
- (c) walking 10th day
- (B) Immobile
- (a) forcible wrenching to correction
- ↓
- (b) fixation
- Method plaster of Paris
- Position corrected
- Time six weeks

## (II) TENDON SUTURE

- Ind (1) Rupture
- (2) Lengthening
- (3) Transplantation
- (4) Tenodesis (fixation)
- Time (1) Primary within 6-8 hours of a clean wound
- (2) Secondary (a) 10-14 days after the rupture
- (b) after subsidence of sepsis
- Tech Suture Lnen thread No. 60
- Chromic catgut
- Kangaroo tendon
- Leave the tendon free in surrounding fat
- Construction of new tendon sheath by tunica vaginalis graft
- Do not drain
- After treat (1) Fixation
- Method plaster of Paris
- Position: relaxation on suture line
- Time six weeks
- (2) Physiotherapy after six weeks

## (III) TENDON TRANSPLANTATION

- Principles (1) Muscles to be transplanted must be
- (a) one that can be spared
- (b) strong and active
- (c) capable of re-education
- (d) near and allied to recipient
- (2) Tendon transplantation in muscles of postural activity is a failure
- Erector spinae, Glutei, Quadriceps extensor
- Calf muscles

- Methods (1) Tendon into Tendon  
Donor passes through a slit in intact recipient
- (2) Tendon into Bone
- Periosteal slit
  - Nailing the bony insertion into the bone
  - Bone drilling

*Some special transplantations*

(1) **Musculospiral Paralysis**

(A) **Complete**

<i>Donor</i>	<i>Recipient</i>
Pronator radii teres	Ext. carpi radialis long & br
Flexor carp. radialis	Abductor pollicis longus
	Extensor pollicis Brevis
Flexor carp. ulnaris	Extensors of the digits
	Extensor pollicis longus

(B) **Partial**

<i>Donor</i>	<i>Recipient</i>
Flexor carpi radialis	Abductor pollicis longus
Supinator longus	Ext. pollicis brevis
Ext. carpi rad. long	Ext. pollicis longus

After treat (1) **Fixation**

Method	cock up splint
Position	wrist extended
	thumb abducted
Time	six weeks

(2) Active movements as soon as wound heals

(2) **Quadriceps paralysis**

<i>Donor</i>	<i>Recipient</i>
Sartorius	Quadriceps extensor

Tech (1) Incision Inner side of the thigh → Inner border of patella → Tubercle of tibia

(2) Separation of sartorius insertion

(3) Suture of sartorius to rectus tendon

After treat (1) Fixation in extension for 10 days

(2) Active movements from 10th day

(3) Full flexion after 8 weeks

(3) **Talipes Calcaneus**

<i>Donor</i>	<i>Recipient</i>
Flexor hall. long	
Flexor dig. long	Tendo achillis
Peronei	

Tech (1) Incision Midline lower part of the calf

(2) Separation and division of tendons low down

(3) Suture of the tendons into tendo achillis

After treat (1) Fixation

Method splint or plaster

Position plantar flexion

Time six weeks

(4) Paralytic Talipes Varus

Donor Recipient

Tibialis anticus cuboid

base of the fifth metatarsal

- Tech (1) Incision over the first metatarsal base  
 (2) Division of Tib. ant. tendon with bone chip  
 (3) Incision anterior midline just above ankle  
 (4) Draw the Tib. ant. tendon through  
 (5) Incision over cuboid or 5th metatarsal base  
 (6) Draw and fix the Tib. ant. tendon

After treat Fixation

Method plaster of Paris

Position dorsiflexion and eversion

Time six weeks

(5) Pes Cavus with clawing

Donor Recipient

Ext. long. hallucis neck of first metatarsal

Ext. dig. com. necks of 2 3 4th metatarsals

Ext. dig. com. external cuneiform (Hibb)

- Tech (1) Division of Ext. tendon expansion  
 (2) Drill the neck of a metatarsal or cuneiform  
 (3) Thread the tendon through

After treat Fixation

Method plaster of Paris

Position dorsiflexion

Time six weeks

(IV) RECONSTRUCTION OF TENDONS by

(A) Fascia Lata

(B) Tendon graft

(V) TENDON SHORTENING

Ind (1) Paralytic stretching

(2) Traumatic fibrosis with stretching

Tech (a) Excision and suture

(b) Y changed into V

After treat Fixation

Method plaster of Paris

Position relaxation

Time six weeks

(VI) TENDON FIXATION TENODESIS

ligamentation of a tendon

(1) Tendo achillis

Ind Paralytic talipes calcaneus

**(2) Peronei**

Ind (a) Paralytic talipes varus

(b) Paralysis of musculocutaneous nerve

Tech (a) separation of a part of tendon from its muscle

(b) its attachment to the proximal bone after correction of deformity

After treat Fixation

Method : plaster of Paris

Position over correction

Time 12 weeks

**(VII) MYOTOMY**

Ind (1) operative incisions

Split along the fibres : do not cut across except

(a) enlarging an incision at right angles

(b) passage for a drainage tube

(2) sliding operation for contractures

Max page for Volkmann

**(VIII) FASCIOTOMY**

Ind Pes cavus

Talipes equino varus

Tech Division of plantar fascia and ligaments

**(IX) FASCIAL GRAFTS fascia lata**

Ind (1) Repair of hernia big or recurrent

(2) Facial paralysis

(3) Fracture patella

(4) Reconstruction of cruciate ligaments knee

(5) Recurrent dislocation of the shoulder

(6) Postage stamp for cranial haemorrhage

**VII. IMPORTANT POINTS**

- (1) Muscle rupture two swellings with a central gap  
Muscle hernia central swelling on active function
- (2) Primary repair of a severed tendon should be performed whenever possible and that too as soon as possible
- (3) Repaired tendon wound should not be drained. If drainage is necessary primary tendon repair is not advisable
- (4) Time of tendon repair
  - (a) Primary immediately within 6-8 hours
  - (b) Secondary after granulations 10-14 days
  - (c) Delayed excision of fibrous tissue and repair
- (5) After repair of the torn tendons, tunica vaginalis graft may be used to form a new tendon sheath so as to prevent adhesions or the tendon may be left surrounded by fat

- (6) Anchoring adhesions within the tendon sheaths are one of the chief causes of disability following injuries and can be prevented by
  - (a) gentle operative technic
  - (b) isolation by grafts
  - (c) early use of the part
- (7) Local or regional anaesthesia is the best for the exploration of tendon ruptures as patient can actively co-operate
- (8) The commonest injury to the finger musculature is the rupture of extensor tendon at its insertion into the last phalanx Mallet finger
- (9) The pathognomonic signs of acute tendon rupture
  - (a) Acutely painful loss of function of a particular muscle during athletics
  - (b) Loss of function of a particular muscle after an incised wound
  - (c) In both cases the function of other associated muscles or other tendons of the same muscle is intact
- (10) In every case of an incised wound or a dislocation look for tendon rupture
- (11) Tennis elbow Pain and tenderness below the external humeral epicondyle worse on attempts at pronation and extension due to injury to common extensor origin or deep head of the pronator or radio-humeral ligament, treated by
  - (a) rest
  - (b) elastic strapping
  - (c) manipulations Extend & adduct
- (12) Pathological rupture of extensor long. pollicis is one of the sequelae of fracture lower end of the radius
- (13) Mallet finger Flexion deformity of the terminal phalanx due to rupture of the terminal slip of extensor
- (14) Tennis leg Rupture of inner head of gastrocnemius and plantaris, giving rise to snap with inability to plantarflex during tennis or jumping and treated by
  - (a) elastic strapping
  - (b) immobilization in plantarflexion
- (15) Fibrositis Painful decubitus  
 Myositis Painful function and spasm  
 Tenosynovitis Exquisitely painful active movement and passive stretching
- (16) Most common cause of acute fascitis is gonorrhoea viz. acute lumbago acute plantar fascitis

- (17) Most common causes of chronic tenosynovitis
  - (a) Tuberculosis
  - (b) Chronic traumatic
- (18) Sinuses round about the wrist
  - (a) ? T B. wrist joint
  - (b) ? T B. carpus
  - (c) ? T B. tendons
- (19) Most common globular swelling round about wrist or knee or ankle
  - (a) Ganglion wrist & ankle
  - (b) Bursitis knee
- (20) Volkmann's Ischaemic Contracture
  - (a) Most important cause is blood effusion round the elbow contributory cause being external pressure due to position bandage or splint
  - (b) Clinically there are two stages
    - (1) Acute circulatory stage 48 hours
    - (2) Late paralytic stage
  - (c) Flexors and Pronators only are affected Extensors and Supinators escape
  - (d) There is no paralysis of Ext. digit communis  
Flexion of the wrist → Extension of the digits  
Extension of the wrist → Flexion of the digits
  - (e) Differential diagnosis from nerve paralysis
  - (f) Critical period when paralysis contraction can be saved by prompt measures is not more than 48 hours
  - (g) Massart's treatment stages
    - (a) Prophylactic within 48 hours  
Remove the pressure
    - (b) Progressive but recoverable  
Brachial sympathectomy
    - (c) Non recoverable
      - (1) Muscle sliding
      - (2) Tendon lengthening
      - (3) Bone shortening
- (21) Never forget to re-examine a limb put in bandage, splint or plaster within 12 and 24 hours
- (22) Avoid pressure encirclement of a limb and also pressure on the anterior aspect of elbow joint
- (23) Most common sites for Traumatic Myositis Ossificans
  - (1) Brachialis anticus Fracture lower humerus
  - (2) Adductors of the thigh Fracture middle femur
- (24) Acute suppurative tenosynovitis must be opened as soon as possible to avoid sloughing

- (25) A muscular swelling  
 (a) ? Contusion or hæmatoma  
 (b) ? Abscess  
 (c) ? Gumma  
 (d) ? Lipoma (inter muscular)
- (26) Tendon transplantation is to be done when nerve regeneration has stopped. Requires careful re-education of donor muscle.
- (27) Contracture of tendo achillis Talipes equinus  
 (a) young children Active and passive stretchings  
 (b) older childhood }  
                           to                            Tenotomy  
                           young adults  
 (c) adults Raise the heel of the shoes  
       Complete tenotomy of tendo achillis is indicated only  
       older children and adolescents and should not be done  
       in adults
- (28) Complete asepsis must be assured in fascia lata grafts
-

## CHAPTER III

# THE BURSÆ

### I. TRAUMA 41

#### (1) CONTUSION

- Sites : Prepatellar olecranon
- Clinic (1) History of injury  
(2) Anatomical site  
(3) Inflammatory cystic swelling
- Compl (1) Bursal hæmatoma  
(2) Bursal hydrops  
(3) Sclerosing bursitis  
(4) Suppurative bursitis
- Treat (1) Cold applications + rest  
↓ (2) Heat + rubefacients + massage  
↓ (3) Aspiration + rubefacients + pressure  
↓ (4) Incision + drainage if suppuration  
↓ (5) Excision if chronic sinus

#### (2) PENETRATING WOUNDS

- Clinic (1) Nothing special  
or (2) Escape of glairy fluid  
or (3) Sepsis with non-healing sinus
- Compl (1) Sepsis  
(2) Fistulæ  
(3) Septic arthritis

#### (3) CHRONIC TRAUMATIC BURSTITIS

##### Occupation bursæ

- Varieties (1) Codman's disease Sub-deltoid bursitis  
(2) Student's elbow Olecranon bursitis  
(3) Weaver's bottom Tuber ischii bursitis  
(4) Housemaid's knee Prepatellar bursitis  
(5) Parson's knee Protuberular bursitis
- Path (1) Thickened wall  
(2) Turbid fluid  
(3) Loose bodies  
(4) Adhesions
- Clinic Well defined cystic fluctuating swelling in an anatomical site
- Treat (1) Scraping with carbolic solution  
(2) Excision through a flap incision



**(4) ADVENTITIOUS BURSÆ**

**Def** Development of enlarged loculated spaces in the subcutaneous tissues, at the site of prolonged friction

- Clinical Varie**
- (1) **Billingsgate hump** Seventh cervical spine
  - (2) **Bunion** Head of first metatarsal
  - (3) **Pathologic** Over bony prominences
    - (a) Pott's angular curvature
    - (b) Talipes
    - (c) Exostoses

**II INFECTION****(1) ACUTE INFECTIVE BURSTITIS**

- Etio**
- (1) **Trauma** contusion wound
  - (2) **Septic infection**
    - (a) wound
    - (b) adjacent focus
    - (c) bloodstream
    - (d) lymphangitis
  - (3) **Secondary to arthritis**
- Path**
- (1) **Serous**
  - (2) **Suppurative**
- Bact**
- |                         |                     |                      |
|-------------------------|---------------------|----------------------|
| (1) <b>Pyococci</b>     | } Prepatellar bursa |                      |
| (2) <b>Streptococci</b> |                     |                      |
| (3) <b>Gonococci</b>    |                     | Olecranon bursa      |
|                         |                     | Tendo achillis bursa |
- Clinic**
- (1) **Anatomical site**
  - (2) **Spasm of the overlying muscle**
  - (3) (a) **Serous** tensely distended localized, fluctuating inflammatory swelling
  - (b) **Suppurative**
    - (1) loss of outline
    - (2) surrounding oedema
    - (3) synovial effusion
    - (4) general septic toxæmia
- Diff. diag**
- (1) **Synovitis**
  - (2) **Cellulitis**
  - (3) **Osteomyelitis**
- Compl**
- (1) **Acute lymphangitis**
  - (2) **Acute cellulitis**
  - (3) **Acute arthritis**
- Treat**
- (1) **Rest and immobilization in relaxation**
  - + (2) **Heat and rubefacients**
  - ↓ (3) **Incision and drainage** if pus

**(2) CHRONIC INFECTIVE BURSTITIS****(A) Secondary** secondary to chronic arthritis

- Clinic (1) Signs of infective arthritis  
 (2) Signs of chronic bursitis

**(B) Tuberculous Bursitis**

Etiol Tuberculosis of the underlying bone or joint

- Sites (1) Around the hip  
 (2) Around the knee  
 (3) Iliopsoas bursa  
 (4) Gluteal bursa  
 (5) Subacromial bursa

- Path (1) Thickening with lining granulations  
 (2) Tuberculous pus with melon seed bodies  
 (3) Chronic sinuses

- Clinic (1) **Fluctuating swelling stage**  
 (a) Well defined or masked fluctuating cystic swelling  
 (b) Spasm of the overlying muscle  
 (c) Fixation in the position of muscular action

- (2) **Chronic sinuses stage**  
 Diff diag (1) T B arthritis  
 (2) T B bone  
 (3) Deep cold abscess  
 (4) Lipoma or fibroma  
 (5) Angioma or aneurysm

- Treat (1) Curettage and B.L.P.P.  
 (2) Excision

**(C) Syphilitic bursitis**

- (1) **Secondary stage** transitory symmetrical effusion  
 (2) **Tertiary stage**  
 (a) Local gumma → gummatous ulcer  
 (b) Diffuse gummatous bursitis

**(D) Gouty bursitis** Chalky deposits**III NEW GROWTHS OF THE BURSAE**

- (1) Endothelioma  
 (2) Fibroma  
 (3) Sarcoma  
 (4) Myxoma

**IV CONSIDERATIONS IN AFFECTIONS OF SPECIAL BURSAE****(1) THYROID AND INFRAHYOID BURSAE**

- Clinic (1) Superficial round midline cystic swelling  
 (2) Median cervical fistula

**(2) BURSÆ ROUND ABOUT THE SHOULDER****(A) Sub-deltoid or Subacromial**

- Etio** (1) Acute rheumatic bursitis  
 (2) Chronic tuberculous bursitis  
 (3) Chronic traumatic bursitis Codman
- Clinic** (1) Sub-deltoid fullness  
 (2) Painful abduction  
 (3) Grating

**(B) Subscapular** Secondary to arthritis**(C) Infraspinatus** Secondary to arthritis**(D) Biceps** Secondary to arthritis**(E) Supra-acromial** Adventitious bursa**(3) BURSÆ AROUND THE ELBOW****(A) Olecranon**

- Etio** (1) Trauma (a) acute  
 (b) chronic student, miner  
 (2) Acute infective ascending lymphangitis
- Treat** Drainage Incision curved upwards
- (B) Bicipital**
- Anat** (a) Bursa between the tendon and the radius  
 (b) Bursa between the tendon and the ulna
- Clinic** (1) Deeply seated ante-cubital cystic swelling  
 (2) Painful and limited flexion and supination

**(4) BURSÆ AROUND THE HIP****(A) Ischial**

- Etio** (1) Weavers bottom  
 (2) Tuberculosis  
 (3) Extension from a bed sore
- Clinic** (1) Painful inability to sit  
 (2) Sinuses

**(B) Iliopsoas**

- Anat** Communicating with  
 (a) Hip joint  
 (b) Psoas sheath
- Etio** (1) T. B. Hip → T. B. Bursitis → Psoas abscess
- Clinic** (1) Tense cystic swelling in scrota  
 (2) Flexion of the hip

**(C) Trochanteric**

- Anat** Between  
 (1) Gluteus max. and trochanter  
 (2) Gluteus max. and Vast. ext.  
 (3) Gluteus med. and bone  
 (4) Gluteus min. and bone  
 (5) Subcutaneous

Etio	Tuberculosis	T B trochanter
Clinic	(1)	Local cystic swelling
	(2)	Eversion of the hip
	(3)	All movements except inversion normal
Diff. diag	(1)	Arthritis hip
	(2)	Osteomyelitis trochanter
Treat	Excision	

## (5) BURSÆ AROUND THE KNEE

### (A) Patellar

#### (1) Prepatellar

##### (a) Acute suppurative

Etio (1) Trauma

(2) Ascending lymphangitis leg

Treat Lateral incisions and drainage

##### (b) Housemaid's knee

Path Chronic occupational bursitis

Treat Excision through up-curved incision

#### (2) Tuberosity

##### (a) Parson's knee

Path Chronic occupational bursitis

Treat Excision

#### (3) Retro-ligamentous

Etio Sprain

Clinic Cystic swelling on either side of lig  
patellæ

### (B) Popliteal

Anat Between (1) Inner

(a) Femur and gastrocnemius

(b) Tibia and semi membranous

#### (2) Outer

(a) Popliteus and ext. ligament

(b) Popliteus and tibia

(c) Biceps and ext. ligament

(d) Femur and gastrocnemius

Etio (1) Trauma

(a) acute

(b) chronic prolonged

(2) Pathological joint

Clinic (1) Firm elastic, avoid swelling

(a) Hard and prominent on extension

(b) Soft fluctuating and reducible on flexion

Treat Excision

Compl Affection of the joint

### (C) Insertional bursæ

(1) Between tendon and bone

(2) Between tendon and tendon

Anat	(1) Semitendinosus
	(2) Gracilis
	(3) Sartorius
Eti	(a) Trauma
	(b) Tertiary syphilis
Clinic	Localized cystic swelling over the inner side of tibial head

## (6) ACHILLIS BURSÆ

Anat	Between Tendon and bone
Eti	(1) Over exertion
	(2) Bad boots
Clinic	(1) Painful walking dorsiflexion
	(2) Cystic swelling on either side of the tendon
	(3) Silky crepitus
Diff ding	(1) Arthritis
	(2) Osteomyelitis or periostitis
	(3) Tenosynovitis
	(4) Cellulitis
Treat	(1) Acute Rest + heat + rubefacients
	(2) Chronic Excision

## V IMPORTANT POINTS

- (1) Etiological factors in bursitis
  - (a) Trauma
    - (1) Acute
    - (2) Chronic and prolonged
    - (3) Friction
      - (a) internal bony prominence
      - (b) external occupational
  - (b) Lymph sepsis
  - (c) Tuberculosis syphilis, gonorrhea, gout
- (2) Remember the close association between a bursa and joint—bone—lymphatics
- (3) Complications of bursitis
  - (a) Cellulitis
  - (b) Abscess
  - (c) Arthritis
- (4) Differential diagnosis of bursitis
  - (a) Intermuscular abscess
  - (b) Cold abscess
  - (c) Arthritis
  - (d) Osteomyelitis or periostitis
- (5) Spasm of a muscle may be due to bursitis underneath
- (6) Deep fluctuating swelling under a muscle, especially between a muscle and a bone
  - (a) ? Cold abscess
  - (b) ? Bursitis

- (7) Arthritis all movements restricted  
Bursitis particular movement restricted
- (8) Be very careful about asepsis in bursae operations as infection may spread to a joint
- (9) In bursitis examine for joint effusion  
In arthritis examine all near by bursae
- (10) Occupational bursitis
- (1) Parson's knee pre-tubercular bursitis
  - (2) Housemaid's knee prepatellar bursitis
  - (3) Weaver's bottom tuber ischi bursitis
  - (4) Student's or miner's elbow olecranon bursitis
  - (5) Codman's disease subdeltoid bursitis
  - (6) Billingsgate hump seventh cervical spine bursitis
  - (7) Bunions first metatarsal head bursitis
- (11) Most common causes of chronic bursitis
- (1) Occupational or adventitious or frictional
  - (2) Tuberculosis
  - (3) Syphilis
  - (4) Secondary to joints
  - (5) Secondary to acute septic bursitis
- (12) Differential diagnosis of a bursal swelling
- (1) Bursa
  - (2) Ganglion
  - (3) Cold abscess
  - (4) Aneurysm
  - (5) Encapsulated lipoma
  - (6) Caseating lymph gland
- (13) Adventitious bursae find out underlying bone pathology or cause of external friction
- (A) Bone
- (1) Exostosis
  - (2) Pressure or friction
  - (3) Callus
  - (4) Angular ankylosis
- (B) External friction
- (1) Ill-fitting shoes
  - (2) Housemaid or Parson etc.
- (14) Injection treatment of chronic bursitis
- Tech 20% formalin glycerine solution
- Sites
- (a) Prepatellar bursae
  - (b) Olecranon bursae
- Ind Chronic bursitis with effusion
-

- ↓ (2) **Sensory recovery** Protopathic → Epicritic  
 ↓ (3) **Motor recovery** Involuntary tonus → Voluntary power

### (C) TREATMENT OF NERVE INJURIES

#### *Indications for operative exposure*

- (1) **Primary**
  - (a) Open wound
  - (b) Suspected division
- (2) **Secondary**
  - (a) Late diagnosis  
Time 3-6 weeks after healing of accidental wounds
  - (b) Infected wound  
Time after control of sepsis
  - (c) Closed injuries  
Time one week of non improvement and appearance of R. D
- (3) **Late** Interstitial neuritis

#### *Preoperative preparation*

- (1) Correct posture
- (2) Physiotherapy
- (3) Asepsis

#### *Operative technic*

- (1) Skin incision
- (2) Exposure of the nerve trunk above → below → local
- (3) Electrical stimulation
  - (a) Faradic response + ve after 2 M normal
  - (b) Faradic response — ve within 5 M degeneration
  - (c) Faradic response — ve after 6 M Permanent damage
- (4) Exposure of the lesion isolation of the nerve  
excision of the scar
- (5) Treatment of the lesion
  - (A) Nerve block syndrome
    - (a) Complete end to-end suture
    - (b) Incomplete neurolysis
  - (B) Irritation syndrome
    - (a) Neurolysis
    - (b) Intraneural injection of absolute alcohol
    - (c) Resection with end-to-end suture
    - (d) Periarterial sympathectomy

## OPERATIONS ON THE NERVE INJURIES

### (I) END TO END SUTURE

- Steps (1) Exposure of the nerve lesion  
 (2) Trim the nerve ends  
 (3) Coaptation and suture of surfaces  
     (a) avoid torsion  
     (b) avoid tension  
     (c) sutures through the sheath only  
     (d) interrupted plain catgut, 000,000  
 (4) Preparation of nerve bed fat, muscle, fascia, tunica

Manoeuvres to bring the nerve ends together without tension

#### (1) Posture

<i>Nerve</i>	<i>Position</i>	
(a) Median	arm	adduction
	elbow	full flexion
	wrist	full flexion
(b) Radial	arm	adduction
	elbow	full flexion
	wrist	extension
(c) Ulnar		
(1) behind the epicondyle	arm	adduction
	elbow	extension
	wrist	flexion
(2) in front of epicondyle	arm	adduction
	elbow	flexion
	wrist	flexion
(d) Brachial plexus	head and shoulder	approximation
(e) Sciatic nerve	hip	hyperextension
	knee	full flexion

- (2) Mobilization of the nerve trunk isolation up and down  
 (3) Lengthening of motor branches by stripping  
 (4) Transposition to new bed  
 (5) Two stage operation  
 (6) Bone shortening

### (II) NEUROLYSIS

- Tech (1) Isolation of the nerve trunk from surrounding scar  
     (a) Capsulectomy-neurolysis external adhesions  
     (b) Endoneurolysis internal fibrosis  
 (2) Transposition and isolation at new surroundings

### (III) OPERATIONS ON IRREPARABLE NERVE LESIONS

- Ind (1) Gunshot injuries  
 (2) Failure of two stage suture

#### (1) BRIDGE OPERATIONS:

- (A) Nerve knif or graft auto, homo, hetero  
 (B) Nerve crossing:  
     Ind Facial nerve (a) Facial—hypoglossal  
                           (b) Facial—glossopharyngeal  
                           (c) Facial—accessory



(2) **SUBSTITUTE NON NERVE OPERATIONS** with indications

- (A) Tendon transplantation Radial nerve paralysis  
 (B) Arthrodesis Shoulder muscle paralysis  
 (C) Tenodesis Paralytic drop-foot  
 (D) Amputation Persistent sores + impaired growth + flail limb

**After-treatment**

- (1) Encasement in plaster of Paris in the position of relaxation of nerve trunk for two weeks  
 ↓ (2) Gradual stretching of flexed joints after two weeks  
 ↓ (3) Retention in the position of relaxation of paralysed muscles:

Nerve	Position	Splint
(a) Brachial plexus	Shoulder abduction Elbow flexion hand physiological wrist dorsiflexion fingers slight flexion thumb abduction + extension	Shoulder abduction splint
(b) Radial	hand physiological	cock up
(c) Median	"	nil
(d) Ulnar	"	nil
(e) Sciatic	ankle right angle	right angle splint

↓ (4) **Nutritional treatment**

- (a) heat (1) dry  
 (2) moist (not in irritation syn.)  
 (b) massage  
 (c) electrical stimulation galvanic → faradic  
 (d) exercises active, passive, against resistance  
 (e) muscle re-education

**Results of nerve suture**

Nerve	Result	Defect
(1) Radial	Best	
(2) Ulnar	(a) Bad for finer professions (b) Good for laborious professions	{ epaeritic sense intrinsic muscles anaesthesia of index finger anaesthesia of the sole intrinsic muscles of the foot irritation and trophic phenomena walking apparatus required
(3) Median	Bad	
(4) Sciatic	Poor	
(5) Ext. popliteal	Good	

**Factors governing the results of nerve suture**(1) **Pre-operative**

- (a) nerve affected specialized  
 (b) infection  
 (c) time of operation primary or secondary  
 (d) pre-operative treatment  
 (e) anatomical situation of the lesion proximal better

- (2) Operative
  - (a) degree of torsion
  - (b) degree of tension
  - (c) suitable bed
  - (d) haemostasis
- (3) Post-operative
  - (a) infection
  - (b) after-treatment
  - (c) co-operation of the patient

#### Causes of suture failure

- (1) Failure of end to end apposition
- (2) Torsion
- (3) Infection
- (4) Intraneural fibrosis
- (5) Extraneural fibrosis

#### Stages of Recovery after a nerve suture

- (1) Tinel's sign Percuss the nerve from below upwards → tingling at the level of regeneration
- ↓ (2) Trophic recovery Disappearance of trophic phenomena
- ↓ (3) Sensory recovery protopathic → epicritic  
~ at the end of third month
- ↓ (4) Motor recovery depends on
  - (a) distance of injury from the centre
  - (b) nature of muscular function

### III SURGICAL NEURITIS

#### (1) FRICTIONAL NEURITIS (See under individual nerves)

##### Clinical varieties

- (a) Brachial neuritis Cervical rib
- (b) Ulnar neuritis Tardy ulnar neuritis
- (c) Sciatic neuritis Sciatica

#### (2) CAUSALGIA

Def Inveterate and ever ascending irritation syndrome due to ascending interstitial neuritis as a result of sepsis in a sensory area

- Etio
- (a) Septic focus
  - (b) Infected wound

- Path
- (1) Ascending interstitial endoneuritis
  - ↓ (2) Compression of nervi nervorum
  - ↓ (3) Ascending irritation syndrome

Clinic Paroxysmal neuralgia, hyperaesthesia, paraesthesia trophic changes

- Sites
- (1) Median
  - (2) Posterior tibial

- Treat (1) **Periarterial sympathectomy**  
 (2) **Sympathetic ganglionectomy**  
 (3) **Forster** Posterior root resection  
 (4) **Spiller** Anterolateral tract resection

## IV NEW GROWTHS OF THE PERIPHERAL NERVES

### (1) NEUROFIBROMA

Def New growth of the connective tissue sheath of a nerve

#### (A) SOLITARY NEUROFIBROMA

Perineurial fibroma

- (1) **Painful subcutaneous nodule**

Path Neurofibroma of a sensory nerve end

Clinic Painful nodule with neuralgia

- (2) **Peripheral nerve trunk neurofibroma**

Clinic (a) Paræsthesia + neuralgia

(b) Situation along the nerve course

(c) Lateral mobility more than long axis mobility

#### (B) GENERALIZED NEUROFIBROMATOSIS: VON RECKLINGHAUSEN

Etio Hereditary and familial

Path (1) Congenital dysplasia Status dysraphicus

↓ (2) Endoneurial fibromatosis

Nervefibria run through the substance of the tumor

#### Clinic (1) NEUROLOGICAL MANIFESTATIONS:

- (A) **Cutaneous neurofibromatosis**  
Molluscum fibrosum

- (B) **Multiple peripheral trunk neurofibromata**

- (C) **Central neurofibromatosis**

(1) *cranial* dorsal choroidal acoustic

(2) *spinal*

(3) sympathetic ganglia and nerve

- (D) **Ocular neurofibromata** Phakomata

- (E) **Generalized neurofibromatosis**

Diffuse and irregular thickenings with nodular tumour like swellings along the course of nerves

- (F) **Plexiform neurofibromatosis**

Conglomeration of tortuous, convoluted thickened and elongated nerve cords with pendulous skin folds

- Sites (1) Head and neck subcutaneous  
 (2) Extremities nerve trunks  
 (3) Abdomen autonomic plexuses

(G) **Elephantiasis neuromatosa**

Enormous thickening of skin and subcutaneous tissues with generalized and plexiform neurofibromatosis of an extremity

(2) **CUTANEOUS MANIFESTATIONS**

**Pigmentary**

- (A) Uniform bronzing  
 (B) Vitiligo patches  
 (C) Freckling  
 (D) Pigmented patches Cafe-au lait  
 (E) Pigmentary hyperplastic patches  
 (F) *Nævi*  
 (G) Blue spots early skin neurofibromata

(3) **SKELETAL MANIFESTATIONS**

- (A) Spinal curvature  
 (B) Exostoses  
 (C) Thinning of bones  
 (D) Osteoporosis  
 (E) Osteomalacia  
 (F) Proliferative joints  
 (G) Spontaneous fractures

(4) **DEVELOPMENTAL MANIFESTATIONS**

*Spina bifida, meningocele*

(5) **ENDOCRINE MANIFESTATIONS:**

- (A) Pituitary  
   (a) acromegaly  
   (b) hypopituitarism  
 (B) Adrenal dysfunction  
 (C) Thyroid dysfunction  
 (D) Sexual gland dysfunction

(6) **PSYCHICAL MANIFESTATIONS:**

Subnormal intelligence

- Clinical forms (A) Complete  
 (B) Incomplete  
 Compl (1) Deformity  
 (2) Sequelæ of different manifestations  
 (3) Sarcoma malignant melanoma

(2) **SARCOMA OF A NERVE**

Eti Generalized neurofibromatosis

Path Early metastases in lung liver lymph glands

- Clinic (a) Sudden and rapid growth of a neurofibroma  
 (b) Severe neuralgia  
 (c) Pressure paralysis  
 (d) Signs and symptoms of secondaries

### (3) STUMP NEUROMA

- Def Fusiform swelling at the end of a divided nerve  
 Etio (1) Failure to cut a nerve short in amputations  
 (2) Infection in amputation wound  
 Path Coiled nerve fibres surrounded by fibrosis  
 Clinic Painful and tender swelling near the end of an amputation stump  
 Compl (1) Adherent scar  
 (2) Painful glossy stump  
 (3) Amputation neuralgia  
 (4) Phantom limb  
 (5) Causalgia  
 Treat (1) Preventive Cut nerves short in amputations  
 (2) Curative Excision

## AFFECTIONS OF SPECIAL NERVES

### (I) CRANIAL NERVES

#### (1) OLFACTORY

- Etio (a) Trauma fracture ant. fossa  
 (b) Endothelioma  
 Clinic Anosmia

#### (2) OPTIC

- Etio (a) Trauma orbital  
 (b) Thrombosis cavernous sinus  
 (c) Tumours endothelioma  
 (d) Aneurysms arteriovenous  
 (e) Pressure pituitary  
 Clinic (1) Blindness  
 (2) Homolateral pupillary reflex present

#### (3) OCULOMOTOR

- Etio (a) Trauma  
 (b) Thrombosis Cavernous sinus  
 (c) Tumour  
 (d) Aneurysm Circle of Willis  
 (e) Pressure  
 Clinic (1) Ptosis  
 (2) Proptosis  
 (3) Ophthalmoplegia  
 (4) Mydriasis  
 (5) Loss of accommodation  
 (6) External strabismus

**(4) RTROCHLEAR**

- Etio As in oculomotor  
 - Clinic Internal strabismus

**(5) TRIGEMINAL**

- Etio (a) **Trauma**: fractures  
 (b) **Tumours**: Acoustic, nasopharyngeal  
 (c) **Aneurysm**: Internal Carotid  
     Clinic partial or complete trigeminal  
         anaesthesia  
 (d) **Sepsis**: teeth, air sinuses  
 (e) **Neuralgia**  
     (1) **Major** (tic douloureux) idiopathic  
     (2) **Minor**: peripheral sepsis  
     (3) **Pressure**: growths  
     (4) **Herpetic**

**TRIGEMINAL MAJOR NEURALGIA**

Def Chronic progressive severe paroxysmal attacks of acute stabbing pain along one or more divisions of the nerve without any sensory or motor loss, there being absolutely no evidence of any organic cause

- Clinic (1) Periodic, intermittent and recurring outbursts of darting pain with hyperaesthesia in the trigeminal field  
 (2) No reduction of sensory or motor function  
 (3) No peripheral reflex focus  
 (4) Local start with a progressive nature

Treat

**(1) INJECTION OF 1-2 c.ca. OF 80-90 % ALCOHOL**

- Tech (a) Anaesthesia local  
 (b) Introduction of needle into the ganglion or nerve trunk  
     (a) saline syringe to first resistance  
     ↓ (β) novocain syringe regional anaesthesia  
     ↓ (γ) alcohol syringe

(A) **Gasserian ganglion or Mandibular trunk at F. Ovale**

- Site (1) **Harris**: Lateral route  
 (a) Lower border of the zygoma one inch in front of anterior root, between coronoid and condylar processes of the mandible  
 or (b) Intersection of  
     (a) line from incisura of the ear to lower border of ala nasi and  
     (β) perpendicular one inch anterior to middle of external auditory meatus

or (c)  $\frac{1}{2}$  inch in front of and below the zygomatic eminence articularis

Direction Inwards with backward and upward inclination

Landmark Pterygoid lamina at the depth of 4 cms.

Depth 5 cms.

## (2) Stewart — Hartel Anterior route

Site (a) Through nasolabial fold opposite 2nd or 3rd molar

or (b) 2 cms. external to the angle of the mouth

Direction (1) Backwards and upwards and inwards

or (2)  $15^\circ$  with sagittal plane 135 with upper jaw

or (3) Aim at pupil

Landmark Base of the skull

## (B) Maxillary nerve at F rotundum

Site Join the line between

(a) Angle of anterior border of coronoid with the malar

& (b) Sharp bend of the frontal process of malar

Site Push the needle at (b)

Direction Inwards and upwards 40 in the above-mentioned line

Depth 5 cms.

Complication of alcohol injection

(1) Failure of approach

(2) Injury to internal max. art.

(3) Injury to eustachian tube

(4) Injury to pharynx

(5) Subarachnoid injection of alcohol  
paralysis of 6th 7th and 8th nerves

(6) Temporary masticatory paralysis

(7) Ophthalmic complications

(a) loss of corneal reflex

(b) diplopia

(8) Headache

(9) Vomiting

Result Anaesthesia and relief from pain for 6 months to 2 years

## (2) OPERATIVE TREATMENT

### (A) PERIPHERAL OPERATIONS; RESECTION OR AVULSION

(1) Supraorbital: Incision along supraorbital margin with notch at centre

(2) Infraorbital: Incision along infraorbital margin

(3) Int. alveolar: Transverse incision over ramus of mandible  
↓ Trephine ramus behind the notch

### (B) INTERMEDIATE OPERATIONS

(1) Resection of 2nd and 3rd divisions

(2) Partial resection of the ganglion

- Tech:** (1) Temporal scalp flap incision  
 (2) Trephine In the angle between anterior and posterior branches of Mid Mening. Art.  
 (3) Excision of the bone  
 (4) Separation of dura from the cranial base upto F Ovale  
 (5) Identification of 3rd branch—ganglion—2nd branch  
 (6) Excision of the nerves or ganglion (spare ophthalmic part)  
 (7) Occlusion of F Ovale and Rotundum

### (C) CENTRAL OPERATIONS

#### (I) RESECTION OF SENSORY ROOT Frazier Hartley Krause

- (1) Frazier or Hartley Krause lateral approach  
 (a) Posture Sitting in a dental chair  
 (b) Anaesthesia Local and general  
 (c) Incision (α) Zygomatico—temporal skin flap  
                   (β) Inverted U-shaped musculo—aponeurotic flap  
 (d) Trephining the skull  
 (e) Separation of the dura from cranial base  
 (f) Ligation of Mid. Mening. Artery  
 (g) Plugging of Foramen Spinosum  
 (h) Identification of Gasserian ganglion  
 (i) Incision of the dural sheath of the ganglion  
 (j) Retraction and division of sensory root  
 (2) Dandy's occipital approach

#### (II) SJOQVIST'S OPERATION (Med. Ann. 1940, Page 342)

**Object** Interruption of passage of painful stimuli to the Trigeminal nucleus

- Tech** (a) Cerebellar exploration  
 (b) Lift up the cerebellar tonsil  
 (c) Horizontal cut 3.5 mm. deep into Medulla Oblongata immediately above the Foramen Magendie

**Result** Only pain sensation vanishes, leaving other sensations intact

**Post-oper. compl**

- (1) Shock
- (2) Haemorrhage
- (3) Cerebral embolism
- (4) Facial paralysis Suture the lids
- (5) Corneal anaesthesia keratitis
- (6) Masticatory paralysis
- (7) Paresthesia facie
- (8) Recurrence



**(6) FACIAL****(A) INTRACRANIAL COURSE****(1) Supranuclear**

- Etio Injury gumma new growth  
 Clinic (a) Lower face more affected  
       (b) *Emotional movements better than voluntary*  
       (c) Homolateral hemiplegia

**(2) Nuclear**

- Etio Haemorrhage thrombosis  
 Clinic (a) Abducens paralysis  
       (b) Taste and hearing unaffected  
       (c) Crossed hemiplegia

**(3) Infranuclear**

- Etio Cerebello-pontine tumour  
 Clinic Involvement of auditory nerve and cerebellum

**(B) CRANIAL COURSE****(1) Canalis facialis of Petrous**

- Etio (a) Skull Fracture base  
                     Callus  
                     Haemorrhage  
       (b) Ear Chronic otitis media  
                     Mastoid operation

**(2) Petrosal part of Petrous**

- Etio (a) Skull Fracture base  
                     Callus  
                     Haemorrhage  
       (b) Operations on Gasserian ganglion  
 Clinic Special features  
       (a) Loss of taste chorda tympani  
       (b) Hyperacusis stapedius  
       (c) Palatal paralysis petrosal

**(C) EXTRACRANIAL COURSE****(1) Stylomastoid foramen**

- Etio Bell's palsy Tetanus

**(2) Peripheral course**

- Etio Parotid  
       (a) Malignancy  
       (b) Operative incision

**(3) Branches**

- Etio Injury accidental or operative  
 Clinic Of extracranial facial nerve  
       (a) Facial palsy of peripheral type  
       (b) Asymmetry of face even when at rest

**Bell's Palsy**

Def	Unilateral rapid facial palsy due to exposure neuritis
Eti	(a) Compression in the stylomastoid foramen due to nerve sheath oedema caused by exposure neuritis
	(b) Geniculate ganglion herpes
Clinic	Facial palsy of peripheral type
Treat	(A) Face
	(a) Support of muscles by
	(α) elastoplast
	(β) fascial grafts
	(b) Physio and electro-therapy
	(B) Nerve
	(a) Suture
	(b) Decompression Ballance-Duel
	Removal of a part of mastoid process
	(c) Crossing
	(α) Hypoglossal
	(β) Glossopharyngeal
	(γ) Spinal accessory
Tech	(1) Incision mastoid tip to hyoid cornu
	(2) Exposure of facial nerve
	(3) Exposure of donor nerve
	(4) Anastomosis Proximal end of donor nerve to distal end of facial
	(5) Closure
	(d) Graft where a portion is missing

**(7) ACCOUSTIC**

Eti	(a) Fracture skull middle fossa
	(b) Auditory neurofibroma
Clinic	(a) Unilateral deafness
	(b) <b>Bezold's triad</b>
	(1) Weber's test
	Fork on vertex heard by healthy ear
	(2) Rinne's test
	Air conduction more than bone conduct.
	(3) Gelle's test
	Bone conduction less on mental air compression
	(c) Schwabach test
	Diminished bone conduction

**ACCOUSTIC TUMOUR · Cerebello-pontine tumour**

Source	Acoustic nerve sheath
Site	Internal acoustic meatus
↓	Cerebello-pontine angle
Path	Slow benign, encapsuled fibroma of nerve sheath

- Clinic (a) Pressure on acoustic nerve unilateral deafness  
 (b) Pressure on neighbouring nerves 5 6 7  
 (c) Pressure on cerebellum ataxia and nystagmus  
 (d) Internal hydrocephalus increased intracranial pressure  
 (e) Other signs of neurofibromatosis

## (8) GLOSSOPHARYNGEAL

### (A) Trauma

- Etio Fracture base  
 Clinic Dysphagia  
 Trophic ulcer of the tongue

### (B) Neuralgia

- Def Neuralgic pain in the tonsil → root of the tongue → ear  
 Etio (a) Primary  
 (b) Secondary to carcinoma tongue or tonsils  
 Treat (1) Neurectomy at Jugular foramen through Posterior fossa  
 (2) Extracranial avulsion

## (9) VAGUS

- Etio (1) Injury Fracture base skull  
 Inclusion in ligature  
 (2) Pressure Tumours malignant  
 Aneurysms  
 T E glands  
 Clinic (1) Tachycardia  
 (2) Intractable cough  
 (3) Hoarse voice paralysis of vocal cord  
 (4) Dysphagia paralysis of palate and pharynx

## (9A) RECURRENT LARYNGEAL NERVE

- Etio (1) Thyroid  
 (A) Operations traction ligature, section  
 oedema  
 (B) New growths Carcinoma  
 (2) New growths Thyroid, oesophagus, mediastinum  
 (3) Aneurysm Aorta, Subclavian Innominate  
 (4) Diphtheria  
 (5) Functional Whispering voice with normal cough  
 Clinic Changes in voice and Cough  
 (1) Bilateral irritation Stridor  
 (2) Bilateral paralysis Aphonia  
 (3) Unilateral irritation Dry brassy cough  
 (4) Unilateral paralysis Monotonous hoarse voice

**(10) SPINAL ACCESSORY**

- Etio** (1) Fracture base skull  
 (2) Malignant glands neck  
 (3) Operations on neck
- Path** (1) Anterior triangle  
 Paralysis of sternomastoid and trapezius  
 (2) Posterior triangle  
 Partial paralysis of trapezius
- Clinic** (1) Drooping shoulder  
 (2) Wasted sternomastoid and trapezius  
 (3) Deficient elevation of abducted arm
- Sequela** Cervical rib syndrome
- Treat** Primary suture

**(11) POSTERIOR LACERATE FORAMEN SYNDROME**

- Etio** Fracture cranium posterior fossa  
 Meningitis gummatous  
 Tumours malignant
- Clinic** Paralysis of 9th 10th and 11th nerves

**(12) HYPOGLOSSAL**

- Etio** (1) Intracranial glosso labio laryngeal palsy  
 (2) Cranial gumma or new growth  
 (3) Cervical  
 (a) Tumours  
 (b) Operations
- Clinic** (1) Hemiatrophy of the tongue  
 (2) Deviation of the tongue to the same side

**(II) PERIPHERAL NERVES****(1) PHRENIC NERVE**

- Anat** 3rd, 4th and 5th cervical
- Etio** (1) Malignant tumours  
 (2) Operative injury  
 (3) Deliberate avulsion
- Clinic** (1) Elevation of the diaphragm one to three inches  
 (2) Paradoxical movements of the diaphragm  
 (3) Collapse and immobilization of lung base

**PHRENIC AVULSION :**

- Ind** (1) Pulmonary tuberculosis  
 (a) Basal lesions  
 (b) Alternative to pneumothorax  
 (c) Addition to pneumothorax  
 (d) Preliminary to thoracoplasty  
 (e) Addition to intercostal neurectomy  
 (f) Cough and hæmoptysis

- (2) Non-tuberculous lesions of the lung base
    - (a) Abscess lung
    - (b) Bronchiectasis
  - (3) Diaphragmatic hernia
  - (4) Diaphragmatic adhesions    respiratory pain
  - (5) Persistent hiccough
  - (6) Operations on oesophagus    as a preliminary
- Tech
- (1) Horizontal 1 incision, 1 above clavicle
  - (2) Exposure of scalenus anticus
  - (3) Exposure of phrenic nerve
  - (4) Injection of the nerve with 10% novocain
  - (5) Clamp and divide below the anaesthesia
  - (6) Avulsion by traction and rotation 10 cms.
  - (7) Resection of nerve to subclavius

If temporary results are required, crush the nerve

## (2) BRACHIAL PLEXUS

- Anatomy
- (1) Roots 5c 6c 7c 8c 1T
  - (2) Trunks
    - (a) Upper 5c 6c
    - (b) Middle 7c
    - (c) Lower 8c 1T
  - (3) Divisions
    - (a) Anterior
    - (b) Posterior
  - (4) Cords
    - (a) Lateral ant. div of upper and middle
    - (b) Medial ant. div of lower
    - (c) Posterior post. div of all
  - (5) Peripheral branches
    - (A) Suprascapular
      - (1) From anterior divisions of nerve roots
        - (a) Scalen and long coll 5 6, 7 8c
        - (b) Phrenic 5c.
        - (c) Dorsalis scapuli 5c.
        - (d) Long thoracic 5, 6 7c.
      - (2) From trunks
        - (a) Nerve to subclavius 5 6c.
        - (b) Suprascapular 5, 6c.
    - (B) Infraclavicular
      - (1) Lateral cord
        - (a) Lateral ant. thoracic 5 6, 7c.
        - (b) Musculo-cutaneous 5, 6, 7c.
        - (c) Lateral head median 5 7c.
      - (2) Medial cord
        - (a) Medial ant. thoracic 8c, 1T
        - (b) Medial antibrach. cut 8c, 1T

- (c) Medial brachial cut 8c, 1T
- (d) Medial head median 8c, 1T
- (e) Ulnar 7 8c, 1T
- (3) Posterior cord
  - (a) Upper subscapular 5, 6c.
  - (b) Lower subscapular 5 6c.
  - (c) Axillary 5 6c.
  - (d) Thoracodorsal: 6, 7 8c.
  - (e) Radial 5 6, 7 8c, 1T

## Root supply:

- (1) C 5 Flexors  
Abductors  
External rotators } of the shoulder
- (2) C 6 (1) Adductors  
Internal rotators } of the shoulder
- (2) Flexors  
Supinators } of the elbow
- (3) C 7 (1) Extensors  
Pronators } of the elbow
- (2) Extensors of wrist and fingers
- (4) C 8 Flexors of wrist and fingers
- (5) T 1 (1) Intrinsic muscles of the hand
- (2) Cervical sympathetic

## Etiology (1) Traction with rupture

- (A) Upper
  - Indirect pull on the flexor caused by separation of shoulder from neck due to
    - (a) Falls
    - (b) Birth traction
- (B) Lower
  - (a) Hanging with arms overhead
  - (b) Breech presentation with arms over head

## (2) Pressure

- (a) Dislocation shoulder
- (b) Malignant infiltration

## (3) Friction Cervical rib

- (4) Incision Accidental or operative
- (5) Laceration

## Clinical

## (1) COMPLETE LESION:

- (A) Complete anaesthesia of the upper limb

Except (a) Supracromial

(b) Intercostobrachial

- (B) Complete paralysis of the upper limb

Except (a) Serratus anterior

(b) Rhomboids

## (2) UPPER LESION ERB-DUCHENNE: 5 &amp; 6 C.

- (A) Sensory anaesthesia over the outer side of the arm
- (B) Paralysis
  - (a) Arm external rotators  
abductors
  - (b) Forearm flexors  
supinators
- (C) Deformity Tip position
  - (a) Arm internal rotation  
adduction
  - (b) Forearm extension  
pronation

## (3) MIDDLE LESION: in addition to Erb-Duchenne

- (A) Paralysis
  - (1) Erb-Duchenne
  - (2) Extensors of wrist and fingers
- (B) Deformity
  - (1) Tip position
  - (2) Flexion of wrist and fingers

## (4) LOWER LESION: ARAN DUCHENNE: 8 C 1 T

- (A) Sensory Inner side of forearm and inner  $1\frac{1}{2}$  fingers
- (B) Paralysis
  - (a) Flexors of wrist and fingers
  - (b) Intrinsic muscles of the hand
- (C) Deformity Wasted claw hand

## (5) KLUMPKE SYNDROME: C8 T1 cervical symp.

- (A) Aran-Duchenne
- + (B) Horner's syndrome
  - Myosis
  - Enophthalmos
  - Ptosis narrowing of the palpebral fissure
  - Anhidrosis of face and neck
  - Loss of cilio-spinal reflex

## (6) INTRA OR EXTRA DURAL ROOT INJURIES:

*Special signs*

- (a) Paralysis of serratus mag and rhomboids
- (b) Anaesthesia over upper scapula
- (c) Pain prominent
- (d) Protopathic loss more than epicritic
- (e) Horner's syndrome
- (f) Cord symptoms
  - (a) Spastic paralysis
  - (b) Dissociation of sensations
- (g) Blood stained C. S. F

Treat

**(1) EXPECTANT**

Ind (a) Subcutaneous injuries which improve automatically

(b) Intra or extra dural rupture

Tech (1) Splinting in the position of the function of paralysed muscles

(2) Physio and electro-therapy

Erb-Duchenne (a) Arm right angled abduction + external rotation

(b) Forearm right angled flexion + supination

**(2) OPERATIVE**

Ind (a) Traction injuries at birth

(b) Compression rib

(c) Open injuries

(d) Contusion dislocations

Time Within 10 days

Contraind (a) Late lesions

(b) High lesions

**(A) Exploration and repair of Brachial plexus**

Tech

Prep (1) Skin preparation

(2) Splint or plaster shell for post-operative relaxation of nerve

**(1) Incision:**

(a) Neck Posterior border of sternomastoid → along clavicle

(b) Neck + axilla (a) Oblique sternomast. → coracoid

(3) Transverse right angles to nerve trunks

(c) Axilla Clavicle → ant. axillary fold → coracobrachialis

**(2) Exposure of plexus and its branches****(A) Complete plexus**

(a) Suprascapular exposure of trunks (between scapular ant. and medius)

+ (b) Division of clavicle

+ (c) Infraclavicular exposure of cords (between deltoid and pectoralis)

**(B) Nerves**

Nerve

Guide

(1) Median Axillary artery → coracobrachialis

(2) Ulnar Axillary vein → axillary artery

(3) Radial Post. axillary wall → axillary art. and vein

(4) Musculocut. Coracoid → coracobrachialis

**(3) Repair of the lesions**

(a) Neurolysis

(b) Resection and suture

(c) Primary suture



## (4) Closure of the wound

## Post-oper. treat

(1) Full relaxation of repaired nerves one week

(a) Release the head end of first week

(b) Release the arm end of two weeks

↓ (2) Full relaxation of paralysed muscles till recovery

## (B) Other operations for Brachial plexus palsy

(1) Arthrodesis of Shoulder At right angles

Ind Erb's palsy with strong forearm and hand

(2) Transplantation of flexors into extensors of wrist

(3) Amputation

Ind Total brachial plexus palsy with no recovery within 18 months

## (2A) CERVICAL RIB

Etiol (1) Cervical rib

(a) Complete rib

(b) Half rib and half fibrous band

(c) Whole fibrous band

(d) Bony boss

(e) Enlarged transverse process

(2) Cervical rib syndrome against normal first rib

(a) Post fixed plexus

(b) Shoulder depression in

(a) Spinal accessory paralysis

(β) Occupational

(T) Age, sex and decubitus

(3) Scalenus syndrome

Path Friction against (1) Cervical rib or its variations  
(2) Normal first rib  
(3) Scalenus anterior

of the lowest trunk (C8 T1)

Clinic (A) NERVE TYPE:

Pressure or friction against nerves

(1) Sensory: Ulnar paresthesia &amp; neuralgia

(2) Motor

Paralysis abductor and opponens pollicis

↓ intrinsic muscles of hand

(3) Deformity

Thenar and hypothenar wasting

↓ Claw hand

(B) VASOMOTOR TYPE:

Pressure or friction against sympathetic

(1) Difference in pulse on both sides

(2) Pulse better in elevation than in depression

(3) Circulatory impairment → gangrene

- Diagnosis** Neuromuscular or vascular symptoms and signs in the right hand of a female adult exaggerated by depression and relieved by elevation or abduction of the shoulder
- Diff diag** (1) Syringomyelia  
(2) Anterior poliomyelitis  
(3) Spinal tumour  
(4) Brachial plexus fibrosis  
(5) Pressure rib tumours  
aneurysms  
malignancy
- Compl** (1) Deformity  
(2) Functional disability  
(3) Circulatory gangrene
- Treat** (A) **Conservative** Posture  
Shoulder elevation exercises
- (B) **Operative**  
(1) Excision of the accessory rib or its variations  
(2) Division of the scalenus anticus from first rib  
(3) Excision of the first rib

### (3) AXILLARY NERVE

- Eti** Fracture dislocation shoulder
- Clinic** (1) **Sensory** Anaesthesia over the deltoid  
(2) **Motor** Inability of shoulder abduction  
(3) **Trophic** Deltoid wasting  
(4) **Deformity** Flat shoulder  
Prominent acromion
- Treat** (1) Support in right angled shoulder abduction  
(2) Physio and electro-therapy

### (4) LONG THORACIC NERVE

- Eti** (1) Toxic-infectious neuritis  
(2) Trauma Operations on  
(a) Glands axilla  
(b) Carcinoma breast  
(3) Pressure Glands  
(4) Friction  
(a) Scalenus medius (swimmers)  
(b) Abnormal first rib  
(c) Excessive elevation of arm
- Sites** (1) Supraclavicular labourers swimmers  
(2) Axilla glands, operation  
(3) Junction of roots abnormal first rib

- Clinic (1) **Motor**  
 (a) Inability to push forwards  
 (b) Inability to raise the arm to vertical  
 (2) **Trophic** wasting serratus anterior  
 (3) **Deformity** winging scapula  
 Treat (1) Primary suture  
 (2) Slings the scapula  
 (a) Fascial graft  
 (b) Pectoralis major

## (5) RADIAL NERVE

### (A) AXILLA:

- Etio (1) **Fracture-dislocation** shoulder  
 (2) **Crutch**  
 Clinic (1) **Sensory** Outer part of the dorsum of the hand  
 (2) **Motor** Inability to extend elbow wrist fingers  
 (3) **Deformity** wrist drop

### (B) MUSCULO-SPIRAL GROOVE:

- Etio (1) **Fracture** humeral shaft  
 (2) **Pressure**  
 (a) Operation table  
 (b) Tourniquet  
 (c) Saturday night  
 (3) **Traction**: operative  
 (4) **Intramuscular injections**  
 Clinic (1) **Sensory** Ball of thumb  
 (2) **Motor** as in A but triceps working  
 (3) **Deformity**: wrist drop

### (C) POSTERIOR INTEROSSEOUS NERVE:

- Etio **Fracture dislocation** upper end of radius  
 Clinic (1) **Sensory**: Nil  
 (2) **Motor** Paralysis of extensors of wrist and fingers  
 (3) **Deformity**: Wrist drop  
 Diff diag **Lead palsy** Volkmann's contracture  
 Treat (A) **Conservative** Cock up splint  
 (B) **Operative**: Exposure and Suture  
 Ind (1) **Penetrating wounds**  
 (2) **Communitated fracture** with nerve injury  
 Fix the fracture → suture the nerve  
 (3) **Closed injuries**  
 Showing no recovery in 12-16 weeks

## Tech (1) Radial N

## (A) Incision

- (a) Above and behind the deltoid insertion
- ↓ (b) Beyond the ext. humeral epicondyle along the medial border of brachioradialis

## (B) Exposure

## (a) Infra-axillary

Interval between axillary artery and vein

## (b) Musculo-spiral groove

Between long and inner head and below the outer head of triceps

## (c) Below the musculo-spiral groove

Between brachialis and brachioradialis at the level of ext. epicondyle

## (C) Post-operative position

Upper arm adduction

Elbow flexion

Wrist extension

## (D) Physiotherapy at the end of two weeks

## (2) Posterior Interosseous nerve

## (A) Exposure and suture

## (1) Incision Dorsum forearm

Between radial extensors and ext. communis

## (2) Exposure Deep to supinator brevis

## (B) Tendon transplantation of Flexors into Extensors

Ind No regeneration in 9-12 months

## (6) MEDIAN NERVE

## (A) AT THE ELBOW:

Eto Fracture-dislocations elbow

Tourniquet

Clinic (1) Sensory Volar side of the outer half of the hand and nail beds outer  $3\frac{1}{2}$  fingers

(2) Motor Paralysis of

(a) Pronators

(b) Outer flexors of wrist and fingers

(c) Thenar muscles

(3) Trophic Wasting of thenar eminence

(4) Deformity Simian hand

(a) Metacarpo-phalangeal extension

(b) Pointing index

(c) Thumb adduction and extension

## (B) AT THE WRIST:

Eto Incised wounds

Fractures

- Clinic** (1) **Sensory** As in (A)  
 (2) **Motor** Thenar muscle paralysis only  
 (3) **Trophic** Wasting of thenar eminence  
 (4) **Deformity** Simian hand
- Treat** **Exploration**
- Ind** (1) Closed injury supracondylar fractures  
 (a) Immediate great pain + total paralysis  
 (b) Delayed no improvement in proximal muscles in five months  
 (2) Penetrating injuries  
 (a) Immediate in all cases  
 (b) Delayed neurolysis
- Tech** (1) Exploration in upper arm  
 Incision Antecubital fossa → ant. axillary fold along the brachial artery  
 Guide (1) Medial border of coracobrachialis  
 ↓ (2) Median basilic vein  
 (2) Exploration at elbow and in the forearm  
 Incision Inner side of biceps tendon  
 ↓ antecubital fossa  
 ↓ midline of the forearm  
 Guides (1) Median basilic vein  
 ↓ (2) Radial border of fl. carpi radialis  
 ↓ (3) Ulnar border of fl. carpi rad. tendon
- Post-oper** Elbow full flexion  
 Wrist flexion

## (7) ULNAR NERVE

### (A) AT THE ELBOW:

- Etio** (1) **Fractures** Supracondylar  
 Internal condyle  
 External condyle  
 (2) **Dislocations**  
 (3) **Cubitus valgus or callus friction:**  
 Tardy ulnar paralysis  
 (4) **Operations** Excision of the elbow
- Path** (1) **Primary** Recent trauma  
 (2) **Secondary** Tardy ulnar paralysis  
 Late traumatic interstitial attrition neuritis due to frictional fibrosis caused by cubitus valgus
- Clinic** (1) **Sensory** Inner  $1\frac{1}{2}$  fingers both sides  
 Ulnar border of the hand  
 (2) **Motor** Loss of  
 (a) Flexion at basal joints } of little  
 + (b) Extension at phalangeal joints } and ring  
 fingers

- (c) **Intrinsic muscles of the hand**  
Adduction and abduction of all fingers
- (d) Adduction of the thumb
- (3) **Trophic** Wasting of hypothemar and interosseous spaces
- (4) **Deformity** Claw hand *Main-en-griffe*
  - (a) Metacarpophalangeal extension
  - (b) Interphalangeal flexion

## (B) AT THE WRIST:

**Eti** Incised wound  
**Fractures**

**Clinic** Same as in A except no sensory changes

**Treat**

(1) **Conservative**

**Ind** Partial lesions

**Tech** Careful splinting of fingers in extension

(2) **Operative**

(A) **Exploration**

- Ind** (1) Penetrating injuries immediate suture
- (2) Closed injuries
  - (a) Immediate suture
  - (b) Delayed neurolysis
- (3) Transposition

**Tech:** (1) **Upper arm**

**Incision** Behind the medial condyle → ant. axillary fold

**Guides** Basilic vein

↓ Median nerve

↓ Internal intermuscular septum

(2) **Elbow**

**Incision** Inner side lower third of arm

↓ Behind the internal condyle

↓ Forearm

**Guide** Internal condylar groove

Two heads of fl. carpi. uln.

(3) **Forearm**

**Incision** Ulnar side of volar forearm

**Guide** (a) Upper third

Two heads of fl. carpi. ulnaris

(b) Middle third

Ulnar artery

(c) Lower third

Interval between flexor carpi uln. and flexor dig. sublimis

(B) **Anterior transposition of ulnar nerve**

**Ind** (a) Suture

(b) Tardy ulnar paralysis

- (c) Recurrent dislocation of the nerve
- (d) Operative treatment of fracture median epicondyle
- Tech (a) Exposure and isolation of nerve trunk
- (b) Stripping up of motor branches
- (c) Preparation of new bed  
Common flexor origin in front of condyle
- (d) Division of internal intermuscular sept.
- (e) Transfer of the nerve to the new bed
- (f) Closure

#### Post-operative Position

- Arm Adduction
- Elbow (a) Flexion if transposition
- (b) Extension if no transposition
- Wrist Flexion

### (8) TWELFTH DORSAL NERVE

#### (A) Neuralgia

- Etio Herpes zoster
- Kidney operations
- Long twelfth rib

Treat Avulsion or division

#### (B) Paralysis

- Etio Kidney operations
- Clinic Post-operative lumbar hernia
- Treat Fascial hernioplasty

### (9) ILIO-INGUINAL NERVE

#### (A) Neuralgia:

- Etio Implication in a suture or a scar in herniotomies
- Treat (1) Under-cutting the scar
- (2) Division or avulsion of the nerve

#### (B) Paralysis

- Etio Gridiron incision and drainage
- Clinic Post-operative direct inguinal hernia

### (10) LATERAL FEMORAL NERVE

Neuritis Meralgia Paræsthetica

- Etio (a) Abdominal operations
- (b) Rheumatism
- Clinic (1) Paræsthesia
- (2) Reduced sensibility } in lateral femoral region
- (3) Tender spots
- Treat (1) Novocain infiltration
- (2) Resection or avulsion

### (11) FEMORAL OR ANTERIOR CRURAL NERVE

- Etio (1) Pelvis fracture or growths
- (2) Hip dislocation
- (3) Groin wounds

- (4) Psoas abscess  
 (5) Infantile paralysis
- Clinic (A) **Paralysis**  
 (1) Sensory Anæsthesia on medial side of foot, leg and thigh  
 (2) Motor Paralysis of extensor quadriceps
- (B) **Neuritis**  
 (1) Pain and paræsthesia in leg thigh and groin  
 (2) Painful impairment of knee extension  
     Tripping difficulty in walking  
 (3) Painful passive adduction-abduction and hyperextension of the hip  
 (4) Tenderness below the great trochanter

## (12) OBTURATOR NERVE

- Etio (1) T. B. Hip  
 (2) Sacroiliac disease  
 (3) Pelvic growths Innocent and malignant  
     Prostate, rectum, cervix bone  
 (4) Obturator hernia
- Clinic (A) **Neuralgia**  
     Pain on the inner side of knee and thigh
- (B) **Paralysis**  
 (a) Inability to press knees together  
 (b) Inability to cross legs

## (13) GREAT SCIATIC NERVE

### (A) PARALYSIS:

- Etio (1) Wounds Fractures, dislocations  
 (2) Injections  
 (3) Tumours  
 (4) Postural or occupational
- Clinic (1) Sensory Complete anæsthesia below the knee except on the medial side  
 (2) Motor Complete paralysis below the knee  
     Weak flexion of the knee  
 (3) Trophic Sore on the sole  
 (4) Deformity Drop-foot

### (B) SCIATICA:

- Etio (1) Primary Interstitial peripheral neuritis  
 (a) Sub-acute non-articular rheumatism  
 (b) Diabetes  
 (c) Influenza
- (2) Secondary Pressure or Friction  
 (a) Cord and meninges  
 (b) Spine and intervertebral foramen



- (c) Nucleus pulposus extrusion
- (d) Sacroiliac joint disease
- (e) Pelvic abnormalities
- (f) Hip joint abnormalities
- (g) Gluteal tumours and fibrous bands
- (h) Postural or occupational
  - (1) Driver's thigh
  - (2) Coal pickers
  - (3) Cross leg posture

- Clinic**
- (1) **Neuralgic pain with tender spots**
    - (a) High or central type
    - (b) Low or peripheral type
  - (2) **Lasague**
    - (a) Flexion of the thigh upon the hip with flexed knee is painless
    - (b) Extension of the knee with thigh flexed on hip is painful in gluteal region
  - (3) **Hallux sign**
    - Thigh and knee extension
    - Pain in gluteal region on
    - (a) Hyperflexion and extension of Hallux  
Whole sciatica
    - (b) Hyperextension only of Hallux  
Internal popliteal
    - (c) Hyperflexion only of Hallux  
Peroneal
  - (4) **X Ray** Spine, pelvis, hip
  - (5) **Rectal Examination**

- Treatment**
- (A) **Injection**
    - (1) **Perineural**  
50 c.ca. saline after novocainization
    - (2) **Epidural Presacral**  
50 c.ca. of 5% novocain  
(avoid injury to the rectum)
    - (3) **Heile's Paravertebral**  
100-150 c.ca. of saline  
Close to the side of 5L. vertebra  
Vertically above the post. sup. iliac spine
  - (B) **Stretching: Under anaesthesia**
    - (1) Closed
    - (2) Open
  - (C) **Operation**  
Section of the small sciatic and internal cutaneous nerve behind the knee

**Exposure of Great Sciatic Nerve**

- Ind (1) Penetrating injuries  
(2) Sciatica

Tech Incision Sacrosciatic notch  
 ↓ Medial to trochanter  
 ↓ Midline of the post. thigh  
 ↓ Medial to biceps

- Exposure (1) Buttock  
 Beneath post. cut. nerve of the thigh  
 (2) Thigh  
 Between biceps and semitendinosus  
 ↓ Lateral to semimembranosus and medial to biceps

Post-oper. (1) Fixation

Method Plaster of Paris  
 Extent Upper thorax to middle of the leg  
 Position Hip hyperextension  
 Knee full flexion  
 Time Two weeks

- (2) Mobilization Flexion of the hip after two weeks  
 Gradual extension of knee after three weeks

# **(14) EXTERNAL POPLITEAL OR COMMON PERONEAL NERVE**

Etio (1) Fracture or excision or tumour of the upper end of the fibula

(2) Wounds Accidental (biceps tenotomy)  
 Operative

(3) Splint pressure

Clinic (1) Sensory Outer leg and dorsum foot

(2) Motor Extensors and peroneals

(3) Trophic Dorsum foot

(4) Deformity Paralytic talipes equinovarus

Treat (1) Conservative

(a) Right angled splint

(b) Boot with iron and toe lifting—spring

(2) Operative

Ind Open injuries

Tech Incision along biceps tendon to fibular neck  
 Guide biceps tendon

# **(15) INTERNAL POPLITEAL OR TIBIAL NERVE**

Etio (1) Popliteal aneurysm or growths

(2) Operative Wounds

Clinic (1) Sensory Anaesthesia of the sole

(2) Motor Paralysis of calf and sole muscles

- (3) Trophic Sole  
 (4) Deformity Paralytic talipes calcaneo-valgus  
 Treat (1) Conservative Splints and boots  
 (2) Operative Exploration

#### Exposure of Tibial Nerve

- (A) Popliteal space  
     Incision Midline in popliteal space  
     Guide Lateral to semimembranous  
             Medial to peroneal nerve and plantaris  
 (B) Upper two-thirds of the leg  
     Incision: Midline of popliteal space and calf  
     Guide Deep to gastrocnemius, soleus and fascia  
 (C) Lower third of the leg  
     Incision Along the medial border of the tibia  
     Guide Under the soleus  
             between flex. long. dig  
                                 and  
                                 flex. long. hall

### IMPORTANT POINTS

#### (1) Main Etiologies of Nerve lesions

- (1) Olfactory fracture ant. fossa.
- (2) Optic pituitary pressure
- (3) Oculomotor pressure
- (4) Trochlear pressure
- (5) Trigeminal neuralgia
- (6) Facial
  - (a) Apoplexy
  - (b) Bell's palsy
  - (c) Fracture skull
  - (d) Otitis media
  - (e) Mastoid operations
  - (f) Parotid operations
- (7) Recurrent laryngeal aneurysm, new growths
- (8) Spinal accessory neck malignancy or operations
- (9) Phrenic avulsion
- (10) Brachial plexus traction or pressure
- (11) Axillary dislocation shoulder
- (12) Long thoracic axillary operations
- (13) Radial fracture, crutch tourniquet, operation table
- (14) Median fracture, tourniquet, wounds
- (15) Ulnar fracture, friction operations, wounds
- (16) Twelfth dorsal kidney exposure
- (17) Ilio-inguinal gridiron incision herniotomy
- (18) Lateral Femoral meralgia
- (19) Femoral infantile paralysis

- (20) Obturator pelvis or hip causes
- (21) Great Sciatic sciatica pressure or friction  
paralysis injection or infantile
- (22) Common Peroneal neck of fibula
- (23) Tibial popliteal aneurysm
- (2) Diagnostic points of nerve palsies
  - (1) Olfactory anosmia
  - (2) Optic blindness
  - (3) Oculomotor ophthalmoplegia + external squint
  - (4) Trochlear deficient down and out movement of eyeball
  - (5) Trigeminal loss of corneal reflex + anesthesia face
  - (6) Abducens internal squint
  - (7) Facial facial paralysis
  - (8) Acoustic unilateral deafness
  - (9) Glossopharyngeal dysphagia
  - (10) Vagus tachycardia + altered voice
  - (11) Accessory inability to raise the shoulders
  - (12) Hypoglossal deviation of the tongue to the same side
  - (13) Phrenic paralysis and elevation of diaphragm
  - (14) Brachial plexus
    - (a) Erb-Duchenne upper lesion tip position  
no abduction of arm
    - (b) Aran-Duchenne lower lesion claw hand  
intrinsic hand  
muscles paralyzed
    - (c) Klumpke : paralysis of intrinsic hand muscles  
+ Horner's syndrome
  - (15) Long thoracic deficient push + winged scapula
  - (16) Axillary inability to abduct the arm to right angle  
flat shoulder
  - (17) Radial wrist drop with dorsal anesthesia  
inability to extend metacarpo-phalangeal jts.
  - (18) Median wasted thenar eminence ape hand  
inability of flexion abduction and apposition  
of thumb
  - (19) Ulnar wasted hypothenar claw hand  
inability of adduction and abduction of fingers
  - (20) Ilio-inguinal post-operative direct inguinal hernia
  - (21) Femoral inability to extend the knee
  - (22) Obturator inability to cross the leg over the other
  - (23) Great Sciatic drop-foot  
paralysis below the knee
  - (24) Common Peroneal paralytic equinovarus  
inability to evert and dorsiflex the  
foot
  - (25) Tibial paralytic calcaneovalgus  
anesthesia of the sole  
inability to invert and plantarflex

- (3) **After-treatment of nerve suture**
  - (A) Stage of Nerve relaxation position of shortest course
  - (B) Stage of Joint correction
  - (C) Stage of Muscle relaxation position of paralysed muscle function
  - (D) Stage of Physiotherapy
- (4) **Results of nerve sutures**
  - (A) (a) Radial best
    - (b) Peroneal good with apparatus
    - (c) Ulnar good for laborious professions  
bad for finer professions
    - (d) Median bad for all professions anaesthesia index  
ball
    - (e) Sciatic bad anaesthesia sole
  - (B) End results of nerve suture depend on
    - (a) Quantitatively  
Number of axons permeating the denervated territory  
(apposition)
    - (b) Qualitatively  
Number of axons making accurate connections  
(absence of torsion)
- (5) **Position after nerve operations :**
  - (a) Position of nerve relaxation two weeks
  - ↓ (b) Position of paralysed muscle relaxation
- (6) Beware of hot water bags and splints in anaesthetic limbs
- (7) **Indications for nerve operations**
  - (1) Immediate open injuries with suspected division
  - (2) Delayed closed injuries with paralysis not improving  
within ten days
  - (3) Late interstitial neuritis
- (7A) The position of nerve trunk relaxation is different from position of paralysed muscle relaxation
- (8) The sequence in nerve regeneration is
  - (a) Tinnel's sign
  - ↓ (b) Trophic recovery
  - ↓ (c) Sensory recovery (a) protopathic → (β) epicritic
  - ↓ (d) Motor recovery
- (9) The rate of nerve regeneration is roughly 1 mm. a day
- (10) **Von Recklinghausen's disease**
  - (a) The disease is a congenital dysplasia
  - (b) The multifarious physical signs develop slowly and one type may antedate others by many years
  - (c) The disease is hereditary and familial
  - (d) Common incomplete forms of the disease are

- (1) Dermatological changes
- (2) Bilateral auditory tumours
- (3) Multiple neuro-fibromata
- (4) Plexiform neuro-fibroma

(11) Sepsis and involvement of the nerve in the scar are the most common causes of painful stump

(12) Trigeminal neuralgia

(a) Diagnosis

- (1) Paroxysmal attacks
- (2) Periodicity
- (3) No sensory or motor disturbance
- (4) No peripheral cause

(b) Alcohol injection into ganglion

- (1) Early cases
- (2) Very severe cases
- (3) Old debilitated patients

(c) Section of the sensory root

- (1) Late and intractable cases
- (2) General good health
- (3) Failure of injection

(d) Disadvantage of alcohol method is the temporary nature of the relief

(e) There are only two most common methods of treating trigeminal neuralgia

- (1) Alcohol injection into the ganglion
- (2) Section of the sensory root

(f) Facial paralysis after the section of the sensory root is due to traction on the great superficial petrosal nerve in the process of stripping dura from the base of the skull

Eyelids should be sutured till the face recovers

(g) Measures according to severity and rarity

- (1) Alcohol injection
- ↓ (2) Peripheral neurectomy
- ↓ (3) Partial resection of ganglion or divisions
- ↓ (4) Resection of sensory root

(13) Alcohol injection into a proper branch or Gasserian ganglion or section of the sensory nerve root relieves the pain of inoperable malignant disease of the face, mouth and paranasal sinuses

(14) Most common causes of facial paralysis

- (a) Apoplexy
- (b) Bell's palsy
- (c) Otitis media
- (d) Mastoid operation
- (e) Parotid incisions

- (15) Injury to spinal accessory may be a cause of cervical rib syndrome. The most common causes of its implication are
  - (a) Malignant glands neck
  - (b) Operations on neck
- (16) Phrenic nerve avulsion indications
  - (1) Basal lesions
  - (2) Accessory and preliminary to collapse therapy
  - (3) Diaphragm irritation
- (17) Brachial plexus lesions
  - (A) Clinic
    - (a) upper arm closely hugs the trunk
    - (b) lower fingers motionless + claw hand
    - (c) Klumpke lower brachial + Horner
  - (B) Contra indication for exploration in brachial plexus lesions high spinal rupture as shown by
    - (a) Prominent pain
    - (b) Anaesthesia over upper scapula
    - (c) Horner
    - (d) Some cord symptom
  - (C) Best time for exploration of brachial plexus is within 10 days of injury with no signs of nerve recovery
- (18) Cervical rib
  - (A) Etio
    - (a) Real cervical rib or its variation
    - (b) Post fixed plexus pressure of first rib or scalenus anticus
    - (c) Shoulder depression
  - (B) Clinic
    - (1) Nervous type
    - (2) Circulatory type
  - (C) Symptoms and signs are relieved by elevation of arm
  - (D) Operation will be beneficial if elevation of the arm and its maintenance on an aeroplane splint relieves the symptoms
  - (E) Tenderness over the scalenus anticus insertion is present in scalenus syndrome
- (19) Do not forget to test all the nerves going through a region in all closed and open injuries of the region especially in
  - (a) Fracture dislocations
  - (b) Open wounds
- (20) Every case of humeral shaft fracture  
Test the radial nerve
- (21) Every case of shoulder injury  
Test all the nerves
- (22) Try to save the twelfth dorsal nerve in kidney operations
- (23) Take care of ilio-inguinal nerve in gridiron appendix incisions, which should never be drained

- (24) Constant giving way of the knee or tripping over is a sign of femoral nerve palsy
- (25) Sciatica
- (a) Clinic Hallux sign
  - (b) Exclude every possible cause of secondary sciatica
  - (c) Do not forget P R. or P V examinations
  - (d) Exclude malignancy in sciatica of old people
  - (e) In obstinate cases, combined paravertebral and presacral routes are best for saline injections but do not exceed 160 c.c. of saline
  - (f) Do not give alcohol injection into sciatic nerve
  - (g) Avoid injury to the rectum in presacral route
- (26) Paralysis of common peroneal - paralytic talipes equinovarus
- Paralysis of tibial paralytic talipes calcaneo-valgus
-



# CHAPTER V

## BLOOD VESSELS, ARTERIES AND VEINS

### I. CONGENITAL ANOMALIES

- (1) Absence
- (2) Accessory arteries or branches
- (3) Anomalous origin
- (4) Anomalous course

### II. TRAUMA

Etiology

#### (1) Penetrating Injuries

- Effects
- (a) External hæmorrhage
  - (b) Internal hæmorrhage
  - (c) Cellular hæmorrhage    hæmatoma

#### (2) Non penetrating or closed injuries

- Effects
- (A) Contusion :
    - (a) Thrombosis
    - (b) Aneurysm
  - (B) Rupture : hæmatoma
- Complications
- (1) Infection
  - (2) Pressure gangrene    indirect traumatic gangrene
  - (3) Infective gangrene
  - (4) Traumatic aneurysm

#### (3) Hæmorrhage

- Varieties
- (1) Etiological :
    - (a) Traumatic    Accidental  
                                 Operative
    - (b) Pathological    Ulceration  
                                 Infiltration  
                                 Congestion  
                                 Varicos
  - (2) Anatomical
    - (a) Arterial
    - (b) Venous
    - (c) Capillary
  - (3) Clinical :
    - (a) External
    - (b) Internal
    - (c) Cellular hæmatoma

- (4) **Time**  
 (a) Primary  
 (b) Intermediary or reactionary  
 (c) Secondary
- (a) **Primary hæm** At the time of accident or operation
- (b) **Reactionary hæm**  
 Time Within 36 hours  
 Causes (1) Recovery from shock  
 (2) Establishment of collateral circulation  
 (3) Slipped ligatures
- (c) **Secondary hæmorrhage**  
 Time 8 to 10 days after the cause  
 Cause (1) Infection → softening + ulceration  
 (2) Sloughing → gangrene  
 (3) Malignancy  
 Clinic (a) Small warning blood streak  
 ↓ (b) Painless sudden gush of blood

**Predisposers** **Blood diseases**  
 (a) Hæmophilia  
 (b) Purpura  
 (c) Jaundice  
 (d) Deficient coagulation  
 (e) High blood pressure

- Cline** (1) **General**  
 (A) Loss of fluid thirst  
 (B) Loss of hæmoglobin pallor  
 (C) Loss of R. B. Ca. air hunger  
 (D) Fall of B. P. shock  
 (E) Loss of vital functions restlessness  
 amaurosis  
 tinnitus
- (2) **Local**  
 (A) **External**  
 (a) Arterial bright red spurts from proximal end, stopped by proximal pressure  
 (b) Venous dark red continuous flow from distal end stopped by distal pressure  
 (c) Capillary continuous ooze, with no bleeding point
- (B) **Internal**  
 (a) General signs of hæmorrhage  
 (b) Signs of fluid in body cavity  
 (c) Signs of pressure on neighbouring structures

**(C) Haematoma**

Def	Collection of blood in cellular tissues		
Clinic	(a) Local	Rapidly increasing acute irregular swelling near the course of a large vessel after trauma	
	(b) Distal	Pressure signs Circulatory Nervous Visceral	
Compl	(1) Infection	→ suppuration → secondary hemorrhage	
	(2) Pressure	gangrene	
	(3) Traumatic	false aneurysm	
	(4) Traumatic	arteriovenous—aneurysm	
Sites	(1) Scalp		
	(a) Subcutaneous		
	(b) Sub-epicranial		
	(c) Sub-pericranial		
	(2) Eye		
	(3) Sub-periosteal	femur, mandible, tibia	
	(4) Scrotal	post-operative	
	(5) Popliteal		
	Etio	Accidental hyperextension of the knee	
	Path	Tearing of the vessel	
Clinic	(a) Trauma		
	(b) Extreme pain		
	(c) Progressive stony hardness		
	(d) Loss of circulation in the leg		

**Treatment of arterial trauma (with hemorrhage)****(A) Immediate**

- (1) Arrest the bleeding
  - Tourniquet
  - Local pressure
- (2) Treat the shock
  - (a) Trendelenburg position
  - (b) Heat
  - (c) Morphia
  - (d) Fluids : water with glucose  
saline  
blood

(3) **Coagulants**

- Calcium
- Blood serum
- Blood transfusion

(B) **Deliberate**(1) **If seen within 6 hours of trauma**

- (a) Tourniquet
- ↓ (b) Exposure
- ↓ (c) Treatment of hæmorrhage or hæmatoma
- ↓ (d) Repair of tissues
- ↓ (e) Treatment of the artery
  - (a) Double ligature
  - (β) Arteriorrhaphy

(2) **If seen after some time after trauma**

- (a) **If pulsation can be felt below the injury**  
Expose and ligature the artery after 4-6 days (collateral circulation)
- (b) **If pulsation cannot be felt below the injury**  
Immediate exposure
  - ↓ (a) Arteriorrhaphy
  - or (β) Excision with Tuffier's tube or veingraft
  - or (γ) Ligature of the artery + ligature of the vein
- (c) **If established gangrene or sepsis**  
Amputate

**Treatment of hæmorrhage**(1) **Primary Hæmorrhage**(1) **Primary arterial compression**(A) **First aid**

- (a) Digital compression
- (b) Tourniquet
- (c) Esmarch's bandage and tube
- (d) Lynn Thomas forceps

(B) **Deliberate**

- (1) **Secure both the ends**
- (2) **Ligature main artery in bleeding of**
  - (a) Palm
  - (b) Sole
  - (c) Face and neck
  - (d) Skull
- (3) **Arterial suture if artery is large**

**(2) Primary Venous hæmorrhage :**

- (a) No tourniquet
- (b) Elevation
- (c) Local pressure by packs
- (d) Ligature of distal or both ends

**(3) Primary Capillary hæmorrhage**

- (a) Local pressure by packs or pads
- (b) Hæmostatic applications
- (c) Thermal applications
- (d) Diathermy
- (e) Suture apposition

**(II) Reactionary Hæmorrhage**

- (a) Prophylactic drainage
- (b) Avoid stimulants during first 48 hours
- (c) Light bandage and packs with elevation
- (d) Re-exposure and treatment of bleeding

**(III) Secondary Hæmorrhage :**

- (1) Tourniquet
- ↓ (2) Plugging and compression (Turpentine & BIPP pack)
- ↓ (3) Cautery
- ↓ (4) Exposure and ligature of bleeding point
- ↓ (5) Ligature of main artery in continuity

**Treatment of hæmatoma****(A) Operative**

- (1) Exposure
- (2) Turn out the clot
- (3) Treat the arterial injury

**(B) Conservative**

- (a) Early Elevation — firm bandage
- (b) Late Fomentations dry—Pot. Iodide

**III ANEURYSM**

**Etiology (1) Congenital: Intracranial**  
Arterio-venous

**(2) Trauma**

- (a) Acute false aneurysms  
arterio-venous
- (b) Chronic and recurrent

**(3) Pathological :**

- (a) Syphilis : Spontaneous
- (b) Atheroma dissecting
- (c) Embolic mycotic
- (d) Sepsis periarterial

- Varieties (1) **Arterial**  
 (a) Saccular trauma  
 (b) Fusiform syphilis  
 (c) Dissecting atheroma
- (2) **Arterio-venous**  
 (a) Aneurysmal varix  
 (b) Varicose aneurysm
- (3) **False aneurysm** Pseudo-sac of cellular tissue due to accumulation of blood, communicating with the arterial lumen.

## (I) ARTERIAL ANEURYSMS

### (A) SPONTANEOUS ARTERIAL ANEURYSM:

- Eti Sex male  
 Age 40-60  
 Predisp (a) Syphilitic mesarteritis or atheroma  
 + (b) Intermittent hypertension  
 + (c) Repeated trauma
- Clinic (1) **Intrinsic**  
 An oval or round cystic swelling along the course of an artery with  
 (a) Expansile pulsation  
 (b) Bruit  
 (c) Thrill  
 (d) Effect of proximal pressure on tension
- (2) **Extrinsic pressure signs**  
 (a) Circulatory weak pulse  
 oedema  
 gangrene  
 (b) Nerve sensory motor trophic  
 (c) Bones painful absorption  
 (d) Viscera dyspnoea, dysphagia etc.
- Signs (1) X Ray  
 (2) Arteriography  
 (3) Positive Kahn  
 (4) Exploration
- Diff. diag (A) **Swelling under an artery** Careful palpation  
 (B) **Swelling over an artery**  
 (a) Tension unaltered with proximal pressure  
 (b) Disappearance of pulsation on altered position  
 (C) **Pulsating tumours** Irregular consistency  
 Indefinite outline  
 Any position  
 (D) **Other causes** Of deep seated pain

- Compl (1) Coagulation  
 (2) Infection → Inflammation → suppuration  
 (3) Rupture → Hæmorrhage internal external cellular  
 (4) Pressure On neighbouring tissues gangrene paralysis
- Treat (1) General  
 (a) Treatment of syphilis  
 (b) Treatment of hyperplasia  
 (c) Pot. Iodide Calcium 2% Sterile gelatin injections
- (2) Local  
 (A) Operative  
 (a) Ligature  
 (1) Proximal  
 (a) Hunter  
 (b) Anel  
 (2) Distal :  
 (a) Brasdor  
 (b) Wardrope  
 (3) Proximo-distal Pasquin  
 Results (a) Failure  
 (b) Recurrence  
 (c) Gangrene  
 (b) Ligature and Excision of the sac  
 (c) Matas Endoaneurysmorrhapy  
 (from within the sac)  
 (1) Obliterative  
 (2) Restorative  
 Ind Saccular aneurysm with one communication  
 (3) Reconstructive  
 Over a rubber tube  
 Ind Fusiform healthy walled aneurysm  
 (d) Arteriovenous Anastomosis  
 Babcock  
 (e) Acupuncture Needling  
 (f) Insertion of wiring  
 (g) Amputation  
 Ind (1) Gangrene  
 (2) Hæmorrhage  
 (3) Infection  
 (4) Erosion with leakage
- (B) Conservative—Proximal pressure  
 Digital  
 Bands or Clamps

**(B) TRAUMATIC ARTERIAL ANEURYSM:**

- Etiol** (1) Subcutaneous contusion or rupture  
 (2) Penetrating injuries
- Sites** Limbs, cranium
- Path** (1) **True Aneurysm**  
 Stretched arterial scar
- (2) **False Aneurysm**  
 Diffuse pulsating arterial hæmatoma, surrounded by fibrous wall derived from the neighbouring cellular tissue
- Clinic** (1) Same as spontaneous  
 (2) History of trauma  
 (3) Scar over the tumour  
 (4) No general disease
- Treat** (1) **True traumatic aneurysm**  
 (A) **Immediate**  
**Ind** (a) Rapid blood extravasation  
 (b) Oncoming gangrene  
 (c) Relative sepsis  
**Tech** (1) Arrest of hæmorrhage  
 (2) Clear the extravasation  
 (3) Restoration or ligature of both ends
- (B) **Delayed** After circumscription and establishment of collateral circulation  
**Time** 3-6 months after trauma  
**Tech** As in spontaneous aneurysm
- (2) **False Aneurysm**  
**Tech** (a) Tourniquet control  
 (b) Evacuation of the clot  
 (c) Obliteration of sac by sutures

**Special Aneurysms****(1) AORTIC ANEURYSM**

- Sites** (1) Thoracic  
 (2) Abdominal
- Treat** (A) **Conservative**  
 (a) Needling  
 (b) Wiring with electric current  
 (c) Pressure by hands
- (B) **Operative**  
 (1) **Ligature** (a) proximal  
 (b) distal  
 (2) Aneurysmorrhaphy  
 (3) Babcock arterio-venous anastomosis  
 Cardiac ends of common carotid art. and int. jugular v for aneurysm of thoracic aorta
- (C) **Palliative Paravertebral alcohol injections**



**(2) INNOMINATE ANEURYSM**

Treat (A) Ligature :

(a) Distal

(a) Common carotid art.

(β) Subclavian art.

(b) Proximal

Post-compl (1) Cerebral tie common carotid first

(2) Gangrene arm

(B) Arterio-venous anastomosis of Babcock

**(3) COMMON CAROTID ANEURYSM :**

Treat (A) Distal ligature

(B) Rapid occlusion

(a) Ligature proximo-distal (ext. car)

+ (b) Excision or obliteration of the sac

(C) Gradual Occlusion

Ind age over 40

Tech bands, clamps

**(4) INTERNAL CAROTID ANEURYSM**

(A) Extracranial

Etio Young people

Clinic (A) Intrinsic

(a) Nil

or (b) Peritonsillar swelling

or (c) Lateral pharyngeal swelling

(B) Extrinsic Dysphagia, dyspnoea, trismus

Diff diag (1) Peritonsillar abscess

(2) Pharyngeal abscess

(3) Other causes of pressure symptoms

Treat Ligature

(1) Internal carotid

or (2) Common and ext. carotid

(B) Intracranial

Etio Fracture skull

Congenital

Clinic (1) Noisy bruit

(2) Local pressure signs

(3) General cranial pressure signs

Treat Ligature (1) Internal carotid

or (2) Common and ext. carotid

Post-compl Cerebral within two weeks

**(5) EXTERNAL CAROTID ANEURYSM :**

Treat (1) Excision : After proximo-distal ligature

(2) Ligature of common carotid artery

Post-Compl Cerebral

**(6) SUBCLAVIAN ANEURYSM**

Treat (1) Ligature

- (a) Proximal
- (b) Proximo-distal
- (c) Innominate

(2) Excision After proximo-distal ligature

Post-Compl Gangrene arm

**(7) AXILLARY ANEURYSM**

Compl CEdema or gangrene or paralysis of upper extremity

Treat Matas endo-aneurysmorrhaphy

- (a) Restorative
- (b) Obliterative

**(8) ILIAC ANEURYSM**

Compl CEdema, paralysis or gangrene of lower extremity

Treat (1) Ligature

- (a) Proximal
- (b) Distal
- (c) Proximo-distal

Compl Gangrene

(2) Endo-aneurysmorrhaphy Obliterative

(3) Excision After proximo-distal ligature

**(9) FEMORAL ANEURYSM**

- Diff. diag
- (1) Femoral hernia
  - (2) Saphenous varix
  - (3) Lymphadenitis
  - (4) Cold psoas abscess
  - (5) Psoas bursitis
  - (6) Lipoma
  - (7) Misplaced testis

Treat (1) Excision After proximo-distal ligature

(2) Endo-aneurysmorrhaphy

**(10) POPLITEAL ANEURYSM**

- Diff. diag
- (1) Bursa
  - (2) Baker's cyst
  - (3) Varicose vein
  - (4) Abscess
  - (5) Lipoma

Compl Pain paralysis, edema, gangrene of the leg

Treat (1) Ligature Of all kinds

- (2) Excision with reconstruction of the artery
- (3) Matas obliterative endo-aneurysmorrhaphy

Accessory treat

+ Femoral arteriotomy + Femoral vein ligature

**(11) GLUTEAL AND SCIATIC ANEURYSM**

(A) Extrapelvic  
Treat Excision

(B) Intrapelvic  
Treat Ligature of Internal Iliac

**(12) ANEURYSMS BELOW KNEE AND ELBOW**

Treat Excision

**(13) INTRACRANIAL ARTERIAL ANEURYSMS :**

Etio (A) Congenital

(B) Acquired or Pathological

(a) Traumatic

(b) Arteriosclerotic

(c) Syphilitic

(d) Mycotic

**Congenital intracranial arterial aneurysms**

Etio Age Young

Site Arteries of the base Circle of Willis

Path Multiple, berry aneurysms

Clinic (1) Recurring unilateral migraine

(2) Focal signs

(a) Cranial nerve palsies 3 4 6 7 8

(b) Trigeminal neuralgia ophthalmic

(c) Cerebellar signs

(3) General pressure signs If rupture

(4) Special signs :

(a) Bruit over the skull

(b) X Ray

(c) Cerebral arteriography

10 c.c. of thorocontrast into : common carotid

Dag Relief of pain by compression on ipsilateral carotid artery

Compl (1) Spontaneous rupture :

Path Subarachnoid hæmorrhage

Clinic (1) Meningeal irritation

(a) Cervical tenderness Kehrler

(b) Cervical rigidity

(c) Kernig

↓ (2) Subdural compression :

Unconsciousness

General signs of cranial pressure

Depressed vital centres

↓ (3) Blood in C. S. F

(2) Recurrent hæmorrhage

- Treat**
- (1) **Congenital**
    - (a) **Dott** Exposure and packing muscle graft
    - (b) **Babcock** Arterio-venous anastomosis of
      - { Cranial end of common carotid
      - { Cardiac end of jugular vein
  - (2) **Pathological**  
Ligature of common carotid artery
  - (3) **Ruptured**
    - (a) Rest with sedatives
    - (b) Intravenous hypertonic saline
    - (c) Repeated lumbar punctures
    - (d) Decompression

## (II) ARTERIO-VEINOS ANEURYSMS

**Def** Abnormal communication between an artery and a vein, either direct or through an intervening sac.

- Etiology**
- (1) **Traumatic** Simultaneous trauma to companion artery and vein  
(Bullet wounds)
  - (2) **Congenital**
  - (3) **Spontaneous** Rupture of an aneurysm into a vein

- Varieties**
- (1) **Aneurysmal varix**  
Direct arterio-venous fistula
  - (2) **Varicose aneurysm**  
Sac between two vessels

- Sites**
- (1) **Congenital**
    - (a) Lower limbs
    - (b) Scalp
    - (c) Pia mater
  - (2) **Traumatic** Companion artery and vein at exposed sites  
Scarpa, popliteal neck axilla, antecubitum, cavernous sinus

- Path**
- (1) **Vein** Varicosity and arterialization
  - (2) **Artery** Proximal dilatation
  - (3) **Communication**
    - (a) Fistula
    - (b) Interposition of sac
  - (4) **Local circulation**
    - (a) Venous pulsation
    - (b) Venous stasis
    - (c) Arterial deficiency
  - (5) **Heart and circulation:**  
Tachycardia → hypertrophy → dilatation  
→ decompensation

Clinic	(1) <b>History</b>	Congenital or traumatic
	(2) <b>Site</b>	
	(3) <b>Local</b>	
	(a) <b>Aneurysmal varix :</b>	Small stationary swelling with a thrill and a bruit in the course of an artery and a vein
	(b) <b>Varicose aneurysm</b>	Progressive pulsatile, compressible tumour with thrill and bruit, and tension varying with proximal pressure, in the line of an artery and a vein
	(4) <b>Distal</b>	
	(a) <b>Varicosities</b>	
	(b) <b>Skin malnutrition</b>	
	(c) <b>Hot and oedematous limb</b>	
	(5) <b>Central Tachycardia</b>	
	(6) <b>Branham sign :</b>	→ Good prognosis Slow pulse on compression of the aneurysm
Compl	(1) <b>Malnutrition of the distal limb</b>	gangrene
	(2) <b>Cardiac embarrassment</b>	
Treatment	<b>Operative</b>	
	<b>Detachment or excision of the anastomosis</b>	
	Time 3-6 months after trauma to allow collateral circulation	
	(1) <b>Ligature of the fistula</b>	Ind Small aneurysmal varix
	(2) <b>Double ligature of the artery</b>	With ligature of the vein Ind Small varicose aneurysm
	(3) <b>Quadruple ligature of the artery and vein</b>	
	(4) <b>Quadruple Ligature</b>	With excision or obliteration of varicose aneurysm Ind Big varicose aneurysm
	(5) <b>Restorative procedure</b>	Ind (a) Large aneurysms (b) Bad circulation
	Tech	(1) <b>Exposure</b>
		(2) <b>Isolation of the sac with feeding vessels</b>
		(3) <b>Temporary occlusion proximal and distal</b>
		(4) <b>Removal of the sac</b>
		(5) <b>Suture of the rents in artery and vein</b>
st-compl	<b>Gangrene in the distal part of the limb</b>	

**(A) CAROTIDO-CAVERNOUS ANEURYSM**

- Etio** (1) **Trauma** Fissured fracture cranial base  
Gunshot wounds
- (2) **Congenital**
- (3) **Arterial disease: Aneurysm**
- Clinic** (1) **Eye signs** Pulsating exophthalmos  
Ophthalmoplegia  
Optic neuritis  
Chemosis
- (2) **Subjective Bruit**
- (3) **Pain—headache**
- (4) **Anæsthesia of the face**
- (5) **Dilated veins** orbital and frontal
- Treat** (1) **Ligature**  
(a) Internal carotid  
(b) Common carotid + External carotid  
(c) Int. jugular vein
- (2) **Dandy** Intracranial distal occlusion of internal carotid by silver clips through frontal pituitary approach
- Ind** Recurrence after carotid ligature

**(B) CIRROID ANEURYSM**

- Etio** (1) **Congenital**
- (2) **Traumatic**
- Site** **Temporal and Frontal Vessels**
- Path** Multiple arterio-venous communications
- Clinic** (1) **Mass of tortuous dilated pulsating vessels**
- (2) **Constant humming bruit**
- Treat** (1) **Excision** In small aneurysms
- (2) **McNealy**  
(a) Ligature of external carotid  
↓ (b) Ligature of main branches  
↓ (c) Ligature of feeding vessels  
↓ (d) Excision of the mass
- Each step at the interval of one week

**IV THROMBOSIS AND EMBOLISM****(I) ARTERIAL THROMBOSIS AND EMBOLISM****(A) ARTERIAL THROMBOSIS**

- Etio** (1) **Primary**  
(a) **Trauma**
- (b) **Diseases of the intima**  
Arteritis  
Thrombo-anglitis  
Arteriosclerosis  
Atheroma

- (2) **Secondary** Arrest of an embolus
- Predisp** (1) Infection local or general  
(2) Stasis  
(3) Increased blood coagulability
- Clinic** (1) Evidence of arterial disease  
(2) Circulatory failure in distal part
- Compl** (1) Necrosis  
(2) Gangrene  
(3) Ischaemia
- Treat** (1) **Conservative**  
(a) Expectant  
(b) Heparin: 10 units in 1 c.c. saline intra-venous
- (2) **Arteriotomy**

## (B) ARTERIAL EMBOLISM

Etiology - Women between 30 and 40 years

- Source** (1) **Left side of the heart** 60%  
Malignant endocarditis  
Mitral disease  
(2) Lung  
(3) Aorta atheroma
- Sites** (1) **Constriction of an artery**  
Passage through a narrow space  
Adductor canal  
(2) **Bifurcations** Aorta - common iliac - internal iliac - common femoral - popliteal  
(3) **End arteries** Brain
- Clinic** (1) Organic heart lesion with systemic infection  
(2) Sudden severe pain along an artery  
(3) Peripheral limb loss of circulation
- Compl** (1) **Infarction** Lung signs  
(2) **Gangrene**  
Factors (a) Secondary thrombosis in collaterals  
(b) Reflex vaso-constriction  
(c) Arteriosclerosis
- (3) **Ischaemia**
- Treat** (1) **Conservative**  
(a) Electric cradle, elevation rest  
(b) Intravenous papaverine hydrochlor gr  $\frac{1}{2}$  every 6 hours for 3 days  
(c) Intravenous heparin

## (2) Operative

## (A) Embolectomy

- Ind (a) Lower limb
- (b) Large artery
- (c) Within 6 hours

## (B) Arterectomy

- Ind (a) Small artery
- (b) Late case after 24 hours
- (c) Damaged endothelium
- (d) Impending gangrene
- (e) Poor general health

## (C) Amputation

- Ind Established gangrene

## (III) THROMBO-PHLEBITIS

Def Inflammation of venous walls with thrombosis

Eti (1) Sepsis of the vein wall

## (A) Suppurative thrombo-phlebitis

- (a) Pylephlebitis In appendicitis  
Suppurative thrombosis of mesenteric and portal veins
- (b) Sinus-thrombosis intracranial
  - (a) Lateral in otitis media
  - (b) Cavernous in carbuncle lip
- (c) Puerperal thrombosis
- (d) Acute osteomyelitis
- (e) Septic wounds and injections

## (B) Specific non-suppurative thrombo-phlebitis Typhoid, pneumonia and influenza

## (2) Trauma

- (a) Fractures
- (b) Plasters and splints
- (c) Operative
- (d) Occupational axillary thrombosis

## (3) Venous stasis

- (a) Post-operative
- (b) Post-convalescent
- (c) Varicose veins

## (4) Altered blood :

- (a) Leukæmia
- (b) Essential thrombophilia or thrombo-phlebitis migrans
- (c) Familial phlebitis

## (5) Malignancy Melanoma malignum



Sites	(1)	Left femoral or saphenous
	(2)	Internal jugular
	(3)	Intracranial sinuses
	(4)	Portal vein
Path	(1)	Thrombosis
	(2)	Phlebitis
	(3)	Periphlebitis
Effects	(1)	Proximal embolism
	(2)	Local obliteration
	(3)	Distal venous obstruction
Cline	(1)	Local Pain tenderness and inflammatory linear induration over a vein
	(2)	Distal Edema, cyanosis, dilated veins
	(3)	General Elevation of temp. and pulse rate
	(4)	Special Leucocytosis
Compl	(1)	Suppuration Pyemia
	(2)	Embolism
	(a)	Pulmonary
	(b)	Infarctive
Prognosis	(3)	Congestive edema and hypertrophy of distal limb
	(4)	Phleboliths
	(1)	Excellent traumatic and superficial thrombosis
	(2)	Good post-operative thrombosis
Treat	(3)	Serious suppurative thrombosis
	(4)	Hopeless sinus thrombosis pylephlebitis
	(1)	Prophylactic
	(a)	Early mobilization + deep respiration
	(b)	Avoidance of etiology
	(2)	Conservative :
	(a)	Complete rest with elevation Until all signs disappear
	(b)	Leech-Hirudin 10-15 leeches
	(c)	Heparin : Intravenous
	(d)	Massage and mobilization After 3 weeks
	(3)	Ambulatory
		Elastoplast strapping + ambulation
	Ind	Superficial phlebitis
	(4)	Operative :
	Ind	Acute pyogenic thrombo-phlebitis
	Tech	(a) Proximal ligature : Angular
		Iliocolic
		Jugular

- (b) Drainage of the vein
- (c) Drainage of the primary focus
- (d) Excision of the affected vein

### *Some special forms of thrombo-phlebitis*

(1) TRAUMATIC AXILLARY THROMBO-PHLEBITIS:

**Etiol. Muscular action**

Path	Overstretching or contusion of axillary vein against clavicle or rib
------	--

**Clinic** (a) History of muscular effort

(b) Pain and disability of upper extremity

(c) Firm hard cyanotic edema of the limb

(d) Tender hard, cordlike axillary vein with dilated tributaries

**Diag** Edema of the arm after a muscular strain

Treat	(1) Conservative	Rest + elevation ↓ Elastoplast + physiotherapy
	(2) Operative	Matas Excision of thrombosed segment

**(2) THROMBO-PHLEBITIS OF THE LEG:**

(A) DEEP

(1) FEMORAL VEIN

**Etiology (a) Post-operative**

(b) Puerperal

(n) Specific fevers

(a) Ascending

Site	Left femoral
------	--------------

Case (α) Oblique course

(b) Pressure of

(a) Rt. iliac art.

(β) Sigmoid colon.

(2) **TIBIAL VEIN:**

**Treat Elastoplast** From toes to groin

(B) SUPERFICIAL

(1) LONG SAPHENOUS VEIN:

### **Etiology Varicose veins and its injection treatment**

**Clinical** Local and distal angina

Treat Firm elastoplast strapping  
Moderate exercise

(2) EXTERNAL SAPHENOUS VEIN:

Treat (a) Proximal ligature

(b) **Elastoplast**

(3) **THROMBO PHLEBITIS MIGRANS:**

### Essential thrombophilia

- Clinic Generalized and recurrent attacks of painful thrombo-phlebitis
- Varieties (1) Primary  
(2) Secondary Associated with thrombo angitis obliterans

#### (4) PERIPHLEBITIS:

- Etio Varicose Veins
- Clinic Painful non suppurative cellulitis of the perivenous tissues

### (III) BLOOD EMBOLISM

- Def Arrest of a foreign body circulating in the blood stream at a place in a vessel leading to obstruction and consequent local and distal changes, according to its nature

- Eto (1) Arterial and venous disease  
Blood clot arteriosclerosis and atheroma thrombo-phlebitis

#### (2) Trauma

- (a) Arterial or venous contusions clot  
(b) Fractures fat  
(c) Neck operations air

#### (3) Infection: Pus or vegetations

- (a) Puerperal sepsis  
(b) Pyæmia  
(c) Septic endocarditis

#### (4) Malignancy Malignant cells

- Sarcoma  
Malignant melanoma  
Hypernephroma

#### Path (A) Nature of embolus

- (1) Thromboasis blood clot  
(2) Trauma air fat, clot  
(3) Infection pus, bacteria, vegetations  
(4) Malignancy malignant cells  
(5) Mycotic actinomycosis  
(6) Parasitic filariasis

#### (B) Factors:

- (1) Local source: Septic focus, thrombus  
(2) Foreign body: Embolus  
(a) Aseptic  
(b) Septic  
(c) Malignant

- (3) **Driving force**
  - (a) Trauma
  - (b) Hyperpiesia
  - (u) Ambulation
- (4) **Site of arrest**
  - (a) End artery
  - (b) Constriction
  - (u) Bifurcation

(C) **Local changes**

- (a) Obstruction : thrombus
- (b) Infection pus
- (c) Infiltration malignancy

(D) **Distal changes**

- (a) Acute softening : brain
- (b) Acute ischaemia : retina
- (u) Infarction Spleen, kidney lung
- (a) Multiple abscesses liver
- (a) Gangrene Limbs

(E) **Nature of the embolus**

- (a) Aseptic : obstruction
- (b) Septic suppuration  
bacteremia
- (c) Malignant infiltration

Clinic (A) **Local**

- (1) Brain paralysis
- (2) Retina blindness
- (3) Spleen painful enlargement
- (4) Kidney painful haematuria
- (5) Mesentery gangrene of the intestines
- (6) Lungs
  - (a) Sudden death
  - (b) Pre-cordial pain + dyspnoea
  - (c) Infarction pneumonia
- (7) Liver Portal pyaemia  
Inflammatory enlargement with jaundice
- (8) Limbs : Severe arterial pain → gangrene

(B) **General** Toxaemia

Pyaemia  
Septicaemia

(C) **Special** Leucocytosis  
Arteriography

Treat (1) **Prophylactic**

- (A) Treatment of etiological conditions
- (B) Gentle and delicate handling } of the  
Fixation and non-traumatization } focus
- (C) Disconnection between the prospective  
focus and the general circulation  
Prophylactic ligature of vein

- (a) Aseptic thrombus  
Ligature on cardiac side
- (b) Septic thrombus  
Ligature between the focus and the destination of its draining vein
  - (a) Angular
  - (b) Illocolic
- (2) **Conservative**
  - (A) General treatment of etiology
  - (B) Symptomatic treatment
  - (C) Specific treatment
  - (D) Heparin in blood vessel diseases
- (3) **Operative**
  - (A) Embolectomy } See arterial embolism
  - (B) Arterectomy }
  - (C) Operative treatment of **Primary focus**:  
After severance of its circulatory connection with general circulation

## V DEGENERATIVE ARTERITIS

### Arteriosclerosis and Endarteritis

**Etio** Senile males

- (A) **Toxic states**
  - (a) Syphilis
  - (b) Chronic nephritis
- (B) **Metabolic**:
  - (a) Diabetes
  - (b) Gout
  - (c) Cholesteræmia
- (C) **Infective**
  - (a) Acute
  - (b) Chronic

**Morb. anat**

- (A) **Endarteritis**:
  - Patchy endarteritis
  - ↓ Intimal ulcerations
  - ↓ (a) Patchy calcification and thrombosis (atheroma)
  - (b) Endarteritis obliterans
  - (c) Aneurysm
- (B) **Mesarteritis**
  - Generalized infiltration of muscle-coat
  - ↓ Fibrous
  - ↓ Calcification of the media

- ↓ (a) Arteriosclerosis  
 (b) Hyperplasia  
 (c) Aneurysm
- Clinic (A) Prodromal  
 (a) Peripheral ischaemia  
 ↓ (b) Intermittent claudication  
 ↓ (c) Arterial thickening with no pulse  
 (d) Hyperplasia
- (B) Gangrene / Arteriosclerotic dry gangrene
- Diagnosis (A) Vasodilator response test negative  
 (B) X Ray calcified arteries  
 (C) Histamine wheal test
- Treatment (1) Treat the etiological factor  
 (2) Prophylactic  
 (A) Expectant  
 (a) Diet abstinence from fat  
 (b) Protection and rest local  
 (B) Surgical  
 Ind Threatening gangrene with peripheral pulse present  
 (a) Ligature of femoral vein In Scarpa  
 (b) Sympathectomy Periarterial  
     Hunter's canal  
     (a) Alcohol injection  
     (B) Adventinectomy  
     (c) Arteriotomy Hunter's canal  
     (d) Periarterial Sympathectomy } Hunter's canal  
     + Vein Ligature  
     (a) Peripheral nerve block
- (3) Curative Of gangrene itself  
 (a) Dry dressings With elevation and protection.  
 (b) Periarterial sympathectomy + Vein ligature  
 (c) Amputation  
 Ind (1) Spreading infection  
     (2) Large area of gangrene  
     (3) Intractable pain  
     (4) General bad condition
- Sites (1) Toes Minimal lesions  
 (2) Mid leg & below tibia  
     tubercle  
 Ind non pulsating dorsalis  
 pedis and post. tibia

- (3) Thigh: 3 above knee  
 Ind (a) No popliteal pulse  
      (b) Age over 60  
      (c) Poor general condition  
      (d) Rapid spread

## VL THROMBO ANGITIS OBLITERANS

- Synonyms** (1) Presenile arteritis  
              (2) Juvenile arteritis  
              (3) Buerger's disease
- Def** Presenile, non-syphilitic, chronic, occlusive, medium-sized arteritis with thrombo-phlebitis usually commencing in lower extremities
- Etio** (1) Men in middle thirties 98% Jews  
        (2) Cigarette smoking (Tobacco)  
        (3) ? Bacterial communicable  
        (4) ? Vasospastic
- Site** Lower limb Unilateral → bilateral
- Path** (a) Intermittent vasospasm  
        ↓ (b) Continuous vasospasm  
        ↓ (c) Occlusive arteritis and thrombosis  
        + ↓ (d) Thrombo-phlebitis migrans
- Clinic** (1) Prodromal : Attacks of coldness + blanching + sweating  
           (2) Intermittent claudication  
               Fatigue and cramps on work  
               Relief by rest  
           (3) Postural colour changes  
               Angle of circulatory efficiency  
           (4) Obliteration of Pulse  
               (a) Intermittent vasospasm  
               (b) Permanent occlusion  
           (5) Trophic : onychia → gangrene  
           (6) Thrombo-phlebitis Migrans
- Clinical varieties** Brown  
                   (1) Compensated type with mild claudication  
                   (2) Stationary type with trophic ulcers  
                   (3) Slowly progressive type with relapses  
                   (4) Acute progressive type with gangrene
- Sp. Signs** Arteriography
- Treatment** (1) Medical  
               (A) Pavex passive vascular exercises  
               (B) Contrast baths twice a day 45°-105°  
               (C) Heat electric cradle  
               (D) Avoidance of cigarette

**(E) Intravenous therapy**

- (a) 5% hypertonic saline in recently sterilised distilled water 150-300 c.c.s. three times a week.
- (b) Triple typhoid vaccine
- (c) Padutin (Bayer)

**(2) Surgical**

Ind Vasodilator response test positive

**(A) Temporary measures**

- (1) Periarterial sympathectomy + Ligature of vein
- (2) Local arteriectomy
- (3) Peripheral nerve crushing

Site 6 inches above the ankle  
anterior tibial musculo-cutaneous post tibial nerves

**(C) Radical measures**

- (1) Bilateral lumbar ganglionectomy
- (2) Symparectomy
- (3) Amputation

Ind (a) Failure of conservation  
(b) Spreading gangrene

## VII. VASOSPASTIC DISEASES OF THE ARTERIES

**(1) RAYNAUD'S SYNDROME**

Def Intermittent pallor and cyanosis of the extremities brought on by cold due to intermittent vasospasm of the digital arteries and with lesions limited to the skin.

Eti Neurotic women of 18-30

Causation (a) Sympathetic neurosis  
(b) Local arteriolar muscle sensitivity  
(c) Unbalance between vaso-constrictor and vasodilator hormones brought either by blood muscles or nerves

Clinic (1) Prodromal chilly syndrome  
Cold chilly hands

- ↓ (2) Intermittent attacks of vasospasm
  - (a) Local asphyxia
  - (b) Local syncope
- (3) Hyperhydrosis
- (4) Pulse unaffected



## Clinical types (A) Primary Syndrome

- (a) Normal persons exposed to cold
- (b) Inherited cold fingers
- (c) True Raynaud's disease  
Essential arteriolar vasospasm
- (d) Post-traumatic
- (e) Sclerodactyly

## (B) Secondary To other vascular diseases

- (a) Thrombo-angiitis obliterans
- (b) Arteriosclerosis
- (c) Syphilitic arteritis
- (d) Rheumatic arteritis
- (e) Cervical rib
- (f) General diseases

## Compl (1) Digits

- (a) Anaemic ulceration
- (b) Onychia and paronychia whitlows
- (c) Dry superficial gangrene
- (d) Scleroderma and sclerodactyly
- (e) Decalcification of phalanges

## (2) Kidneys Intermittent haemoglobinuria

## (3) Retina Intermittent blurring of vision

## (4) Brain cortex Paralytic symptoms

## Diff. diag (1) Arteriosclerosis

## (2) Thrombo-angiitis obliterans

## Treat (A) Medical

- (a) Warm climate avoid cold
- (b) Fever therapy \ mixed typhoid  
typhoid antigen  
dinitro-phenol

## (B) Surgical

- Ind (1) Early cases
- (2) Progressive cases
- (3) Positive vasodilator tests

- Contraind (1) Mild cases
- (2) Stationary cases
- (3) Improving cases
- (4) Late cases
- (5) Negative vasodilator tests

Operations (1) Periarterial sympathectomy  
Temporary relief

- (2) Ramisectomy grey rami  
Difficult and temporary

## (3) Sympathetic Ganglionectomy

(A) Stellate

(B) Lumbar 2nd 3rd 4th.

Results (a) immediate very good  
(b) remote good in mild cases

## (2) ACRYOCYANOSIS

Def Prolonged attacks of cyanosis in peripheral parts due to arteriolar spasms

## (3) ERYTHROCYANOSIS

Def Reddish brown discolouration of lower calf in stout women with subcutaneous hypertrophy in some cases

Path Arteriolar spasm + Venous stasis

Treat (1) Physiotherapy

(2) Bilateral lumbar ganglionectomy

## (4) HYPERHYDROSIS

Etiol Emotional young people

Path Sympathetic dysfunction

Clinic Attacks of profuse sweating of hands and feet

Treat (1) Paravertebral alcohol injections into ganglia

(2) Ganglionectomy

## (5) OTHER VASOMOTOR LESIONS

Skin complications III

(a) Infantile paralysis

(b) Pyramidal tract lesions

(c) Spinal cord injuries

(d) Rheumatic arthritis

(e) Causalgia

Treat Sympathetic ganglionectomy

Ind Novocain block test positive

## VIII. VARICOSE VEINS

Def Dilatation, lengthening and tortuosity of Veins

Etiol (a) Women

(b) Familial

Cause (1) Primary

(a) Congenital weakness of vein walls

(b) Gravity with valve failure

(c) Lack of nerve tonus theory

(d) Endocrine theory

(e) New growth theory

(2) Secondary

Obstruction to venous return

Path. Factors (1) Venous stasis gravity

(2) Incompetence of valves

(3) **Changes in venous walls**

(a) Congenial defects

(b) Phlebosclerosis and periphlebitis

<i>Sites</i>	<i>Primary</i>	<i>Secondary</i>	
(1) <b>Esophageal</b>	—	+	<b>Liver cirrhosis</b>
(2) <b>Rectum</b>	+	+	Obstruction local regional liver heart blood pres- sure
(3) <b>Varicocoele</b>	+	+	<b>Malignant kidney</b>
(4) <b>Any veins</b>	—	+	Obstruction by pres- sure of tumours
(5) <b>Saphenous</b>	+	+	Obstruction by gravid uterus arteriovenous aneu- rismal growths

**PRIMARY SAPHENOUS VARICOSITY****Etiology** (a) Congenital weakness of walls

(b) Gravity with absence or incompetence of valves

**Clinical** (1) Pain fatigue, cramps(2) Dilated and tortuous veins in the cyanotic  
oedematous and pigmented leg

(3) Saphenous varix in the femoral triangle

**Signs** (1) Incompetency of superficial veins  
Trendelenburg

(1) Horizontal position with leg raised

↓ (2) Pressure on saphenous opening

↓ (3) Vertical position

↓ (4) Sudden removal of pressure

↓ (5) Veins fill immediately from above down

(2) Incompetency of communicating valves :

(A) **Perthe** Walk with blood pressure cuff  
at the root of the thigh  
Superficial veins emptied

(B) Raise the leg and empty the veins

↓ Constrict the root of the thigh

↓ Stand

↓ Veins fill up within 30 Sec.

(3) Non-potency of deep veins

Elastic bandage from toes to knee

↓ Walk for half an hour

↓ Discomfort

**Diff diag. of saphenous varix**

- (a) Femoral hernia
- (b) Saphenous lipoma
- (c) Cold abscess
- (d) Lymph gland abscess
- (e) Aneurysm femoral or arteriovenous
- (f) Misplaced atrophied testis

**Compl (1) Skin**

Pigmentation  
Pruritus  
Eczema  
Chronic ulceration  
Malignancy

**(2) Sub-cut Edema → elephantiasis****(3) Veins**

Thrombo-phlebitis → phlebolith—pulmonary embolism  
Periphlebitis  
Haemorrhage

**(4) Bones Periostitis → decalcification****Treatment (A) Palliative**

- (a) Elastic bandage
  - (b) Postural treatment
- Ind Pregnancy and mild secondary varices

**(B) Injections**

Pre-investigations primary or secondary

**Indications**

- (a) Much disability
- (b) Complications impending or actual
- (c) Public service entrance

**Contraind**

- (1) Phlegmasia alba dolens with thrombosis or incompetency of deep veins
- (2) Phlebitis
- (3) Septic skin eczema
- (4) Advanced cardiac, renal pulmonary disease
- (5) Diabetes
- (6) Cirrhosis liver
- (7) Pregnancy because
  - (a) varices may be temporary
  - (b) superficial veins needed for future white leg
  - (c) abortion if quinine used
- (8) Advanced arteriosclerosis

**Solutions:-****(1) Quinine-urethane of Genevrier :**

Comp	Quinine Hydrochlor	4 gms.
	Urethane	2 gms.
	Distilled water	30 c.c.
Dose	3 c.c. (1-1 c.c. at each site)	

**(B) Leak ulcer**

Etio Leak from puncture

Clinic Small superficial ulcer

Treat Elastoplast strapping

**(2) Cellulitis and abscess****(3) Persistent oedema of the leg**

Cause Associated deep vein thrombosis

**(4) Recurrences****(5) Pulmonary embolism**

Rare (a) Aseptic sticky thrombus

(b) Reversal of current

**(6) Bacteræmia** ← embolism ← phlebitis**(C) Operations**

Ind (1) Much disability

(2) Complications impending or actual

(3) Public services entrance

**(A) Trendelenburg**

Excision of one inch of the highest part of saphenous vein at the saphenous opening at its entrance into the femoral vein and above its highest tributary

Ind (a) Trendelenburg test positive

(b) Thrill in the veins on coughing

**(B) Excision**

(1) Local varicæ

(2) Babcock's subcutaneous excision of long portions

**(D) Combined operation + injection method**

Ind Trendelenburg test positive

Tech Ligature + aspiration + injection

(1) Elevation of limb; empty the saphenous vein

(2) Ligature the proximal end at highest level

(3) Pass the ligature distal to it

(4) Pass the needle in distal end

(5) Aspirate

(6) Injection of 4-5 c.c. of 5% sod. morrhuate

(7) Tie the distal ligature

(8) Divide the vein between two ligatures

After treat Rest in bed for two days

Advantage Only one sitting

**VARICOSE ULCER: (See gravitational ulcer under skin)**

Clinic (1) Local Single, callous, indolent, irregular ulcer on the inner and lower part of the leg

(2) Regional Cyanosis, oedema, pigmentation, eczema and varicosities

Treat (1) Rest Elevation, elastic bandages

- |     |              |                    |
|-----|--------------|--------------------|
| (2) | Unna's paste | Zinc oxide 3 Parts |
|     |              | Gelatine 3 "       |
|     |              | Glycerine 5 "      |
|     |              | Aqua 9 "           |
- + (3) Elastoplast : Zinc oxide paste elastic bandage
- + (4) Injection treatment of varicose veins
- Compl (1) Sepsis dermatitis, cellulitis, periostitis osteomyelitis
- (2) Haemorrhage
- (3) Oedema

## IX. NEW GROWTHS OF THE BLOOD VESSELS

### (1) HAEMANGIOMA (See under the skin)

- (A) Capillary Mothers mark spider naevus port wine stain
- (B) Compact
- (C) Cavernous
- (D) Cirsoid Racemose or plexiform

### (2) BLOOD-VESSEL SHEATH TUMOURS

Malignant angio-endothelioma

Etio Adults between 40 and 60

Path Angio-endotheliomatous malignant tumour arising from blood vessel sheath

- Clinic (1) Deep circumscribed, bossy firm slow tumour in the course of a large artery
- (2) Arterial aneurysm like tumour with no bruit and not affected by proximal pressure

- Compl (1) Recurrence
- (2) Metastases

Treat Early and high amputation

## X. OPERATIONS ON ARTERIES

### (1) ARTERIAL SUTURE

- Essentials (a) Perfect asepsis
- (b) Intimal apposition
- (c) Least injury
- (d) No foreign material exposure to lumen
- (e) Citrate solution
- (f) No tension on sutures

- Steps (1) Exposure
- (2) Temporary occlusion proximal and distal clamps
- (3) Suture

Methods (a) Lateral

(b) End-to-end

Material 0000 chinese silk sterilized in liquid vasoline

- Tech (a) Three stay sutures  
 (b) Continuous sutures  
 (c) Interrupted mattress sutures  
 (4) Removal of distal  $\rightarrow$  proximal clamps  
 (5) Closure

(2) ARTIFICIAL CANALIZATION OF ARTERY Tuffier's method.

Ind Temporary measure till the establishment of collateral circulation where primary ligature of a main artery may lead to gangrene.

- Tech (1) Preliminary temporary occlusion by Crile's clamp  
 (2) Excision of damaged portion of the artery  
 (3) Introduction and tying in of parafined silver cannula  
 (4) Removal and double ligature after 4 days

After-treat Elevation and protection of the whole limb

(3) LIGATURE OF ARTERIES

- Ind (1) Amputations  
 (2) Haemorrhage  
 (3) Aneurysm  
 (4) Pre-operative  
 (5) Malignancy  
 (6) Toxic goitre  
 (7) Arteriolectomy

- Tech (1) Incision adequate exposure  
 (2) Ligature

Material (a) Non-absorbable Silk

(a) Fascia lata

(a) Chronic catgut

(b) Delayed absorb

- (a) Tie so as to damage the intima but not the media  
 (b) Ligature as near the place of pathology as possible  
 (c) Good isolation before passing the ligature  
 (d) Pass the Ligature away from the neighbouring important structure  
 (e) Temporary proximal occlusion of the artery while ligature is tightened  
 (f) Ligature both ends to haemorrhage  
 (g) Arteriolectomy is better than ligature in continuity  
 (h) Ligature of the companion vein should accompany ligature of the main artery

Ligature of special vessels

(1) Innominate

Removal of sternum

(2) Subclavian:

- Incision (1) Along the clavicle  
 (2) T-shaped with division of clavicle

Compd Gangrene arm

(3) Common carotid

Incision: Along ant. border of sternomastoid with cricoid as midpoint

Tech Fascial strip suture

Compl Cerebral

- (4) External Carotid }  
(5) Internal Carotid }

Incision Along ant. border of sternomastoid from cricoid to mastoid

- (6) Lingual:

Incision (1) Along ant. border of sternomastoid (as for 4)  
(2) Along the upper cornu of hyoid

- (7) Superior Thyroid: (as for 6)

- (8) Axillary:

Inc (1) T-shaped with division of clavicle  
(2) Below and along the middle half of the clavicle

- (9) Brachial

Inc (1) Along the line of the artery  
(2) Mid-clavicle to antecubital fossa

- (10) Brachial bifurcation and its branches:

Inc (1) Along the inner side of biceps tendon  
(2) Along the lines of the branches  
(a) Radial between brachioradialis and flexor carp. rad.  
(b) Ulnar along radial margin of flex. carp. uln.

- (11) Common Iliac }  
Internal Iliac } Transperitoneal route

Incision Median umbilicus to pubes

- (12) External Iliac Extraperitoneal route

Inc  $\frac{1}{2}$  inch above and parallel to outer  $\frac{1}{3}$ rd of Pospart

- (13) Femoral

- (A) Common Femoral: Do not ligature  
(B) Superficial Femoral  
(a) Scarpa  
(b) Hunter

Incision Along the line of artery

(mid point of symphysis pubis and ant. sup. spine to adductor tubercle)

- (14) Popliteal

- (A) Upper Popliteal

Inc Adductor tubercle  $\rightarrow$  along the arterial line on the inner side

- (B) Lower Popliteal and Bifurcation

Inc 4 inches vertical between two heads of gastrocnemius

- (15) Posterior Tibial

Inc (1) 1 inch behind and parallel to inner tibial border  
(2) Between heads of gastrocnemius  
 $\downarrow$  medial side of tendo achillis

- (16) Anterior Tibial:

Inc Mid-tibiofib-ula to mid-malleol anterior

- (17) Gluteal and Sciatic

Inc Semilunar iliac crest  $\rightarrow$  great trochanter  $\rightarrow$  iliac crest



## (4) EMBOLLECTOMY

Anesth Local

- Points (a) Rinse the gloves, instruments and sutures in 2 % citrate solution  
 (b) Vaseline the curettes and probes  
 (c) Localize the embolus  
 (1) Site of pain  
 (2) 4"—8" above the upper level of ischaemia  
 (3) Pulse obliteration  
 (4) Arteriography  
 (5) Exploration at likely places

- Tech (1) Incision  
 (2) Exposure of main vessel and its branches  
 (3) Clamp proximal to the clot  
 (4) Distal arteriotomy  
 (5) Expression of the embolus and thrombus  
 (6) Suture of the artery by vaselined fine silk

If embolus is not found

- (a) Dissect out the proximal part of the artery  
 (b) Open the artery and introduce catheter, curette or forceps

## (5) ANEURYSM

Pre-operative treatment

Non-surgical or non-mechanical intermittent compression of the parent artery

Endo-aneurysmorrhaphy

## (A) Obliterative

- Advant (a) Least interference with collaterals  
 (b) Least interference with surroundings
- Steps (1) Temporary digital arrest of circulation  
 (2) Incision and clearing of the sac.  
 (3) Suture of the orifices  
 (4) Obliteration of the whole sac.

## (B) Restorative

Ind Saccular aneurysm with small communication between the sac and vessel

- Steps (1) } As in (A) above  
 (2) }  
 (3) Suture the communication and other orifices  
 (4) Obliteration of the whole sac, leaving the artery intact

## (C) Reconstructive

Ind Fusiform aneurysm with healthy walls  
 Proximal and distal outlets near to each other

- Steps (1) } As in (A) above  
 (2) }  
 (3) Reconstruction of lumen over a catheter passed in the parent vessel  
 (4) As in (B) above

## (6) PERIARTERIAL SYMPATHECTOMY

## (A) Adventitiectomy

Ind Temporary improvement of peripheral circulation in

- (a) Chronic ulcerative lesions
- (b) Dry gangrene
- (c) Preliminary to amputations

Steps (1) Exposure

(2) Isolation

(3) Sub-adventitious injection of saline

(4) Clipping away  $1\frac{1}{2}$  of adventitia all round

## (B) Alcohol Injection

Steps (1) } As in (A) above

(2)

(3) Injection of 12-20 minims of alcohol into adventitia for one inch all round

## (C) Arteriotomy

Steps (1) } As in (A) above

(2)

(3) Double ligature at upper extremity

(4) Double ligature at lower extremity

(5) Excise 1 —  $1\frac{1}{2}$  of the intervening portion

## (D) Accessory operation

Ligature of companion vein

## (7) BLOOD TRANSFUSION:

Ind (1) Haemorrhage (A) Severe primary

(a) Traumatic

(b) Pathological (jaundice)

(B) Secondary

(2) Haemolytic Anemias

(3) Toxic states (a) Toxicemias

(b) Uraemia

(c) Diabetic coma

(d) Burns

(e) Convulsions

(4) Infectious immuno-transfusion

(5) Defective coagulation

(a) Jaundice

(b) Haemophilia

(c) Purpura

(6) Restorative: Pre and post-operative

Time (1) Prophylactic pre-operative

(2) Therapeutic

Varieties (1) Homo-transfusion

(a) Another donor

(b) Cadaver

(c) Placental

(d) Preserved

## (2) Auto-transfusion

Collection of blood, bled from patients own body and its reintroduction after filtering as in

(a) Hæmothorax

(b) Hæmoperitoneum

*N.B.*—There should not be any injury to the Internal hollow viscera or any contamination.

## Investigations

## (1) Blood matching

## (A) Group tests

Group I universal recipient

Group II recipient of II and IV

Group III recipient of III and IV

Group IV universal donor

Every group being recipient and donor of its own group

## (B) Individual tests

## (1) Cells of donor + serum of recipient

Serum of the recipient should not agglutinate the corpuscles of donor (and vice versa)

## (2) Blood drop of donor + Blood drop of recipient

No clumping

(Only in urgent cases)

## (C) Cross grouping (cross-agglutination) test

## (1) Serum of recipient against donor's cells

## (2) Serum of the donor against recipient's cells

(1) Plasma { (a) Mix 6 drops of blood from the finger  
with  
one drop of 5 % sod. citrate  
(b) Centrifuge  
(c) Pipette off the supernatant plasma

(2) Cell Mix one drop of packed cells  
with  
2-3 c.c. of saline

## (3) Do the slide test

Plasma (1c) + cell suspension (2)

Watch for agglutination

## (2) Investigations of both

(a) Blood pressure

(b) Heart condition

(c) Blood condition

(d) Renal condition

## (3) Investigations of donor only

(a) Metabolic diseases

(b) Specific communicable diseases syphilis, malaria

## Methods

## (1) Direct method:

## (2) Indirect method

## (A) Whole blood without admixture of anticoagulant

(a) Lindeman's syringe method

(b) Kimpton Brown paraffined flask

## (B) Citrated blood

## (a) Storage method

Stored in citrate sol. and infused afterwards

## (b) Simultaneous method: Three way syringe:

(α) to donor

(β) to citrate sol.

(γ) to recipient

## (3) Dry method

Preserved r.b.c.s and dried bloodplasma

A known amount of saline is added to these before transfusion

## Blood storage methods

## (1) Living donor citrated blood

## (2) Cadaver 900-3500 c.c.s. from internal jugular vein within 6 hours of death from asphyxia without any infection in body

## (3) Fœtal

(a) Blood collected from the severed placental end of umbilical cord, citrated and preserved

(b) Shaken—warmed—filtered

↓ transfusion if suitable

(eclampsia is no bar)

## (4) Dry method

(a) preserved blood cells

(b) preserved blood plasma—powder

## Anticoagulants

## (A) Citrate method

3.8% isotonic sodium citrate sol.

one part of citrate to 9 parts of blood

## (B) Heparin method

Intravenous heparin to donor  $\frac{1}{2}$  hour previous, dose being 1 mgm. per kiloweight. Blood remains fluid for 30 to 40 minutes

## (C) I. H. T. Solution (Moscow)

Composition	Sodium chloride	7.0	grms.
	Sodium citrate	5.0	"
	Potassium chloride	0.02	"
	Magnesium sulphate	0.004	"
	Distilled water	1000.	c.c.
	mixed with equal parts of blood		

Temperature for preservation of blood 2° to 4° C.

## Sites (1) Elbow veins

(2) Internal saphenous near the ankle

(3) Superior longitudinal sinus (Infants)

## Quantity

(1) Hemorrhage

300—700 c.c.s.

nearly as much as lost

- (2) Anæmia—toxæmia  
75—150 c.c. repeated
- (5) Infants 10 c.c. per pound body weight
- Compl (1) Rigors  
(2) Temperature  
(3) Cardiac embarrassment  
(4) Hæmolytic (1) Jaundice  
(2) Uræmia  
(5) Anaphylactic Shock urticaria  
(6) Urinary suppression

## IMPORTANT POINTS

### (1) Hæmorrhage

- (a) Never give intravenous saline in cases of hæmorrhage till its source is under complete control.
- (b) Beware of internal hæmorrhage in operations on internal viscera. Always adopt a position which facilitates the appearance of bleeding externally in these cases whenever possible, viz. raise the head in rectal or uterine operations.
- (c) Never start an operation, in which some bleeding is expected without ascertaining the coagulation and bleeding time.
- (d) Beware of a bandage where hæmatoma is expected the pressure symptoms may develop afterwards as the hæmatoma progresses.
- (e) Never forget to see the colour of conjunctivæ, mucous membranes and nails in every acute surgical condition, traumatic or non traumatic.
- (f) Beware of reactionary hæmorrhage in amputations and after operations done in shock. Beware of secondary hæmorrhage in all septic conditions.
- (g) A streak of blood on 5th or 6th day after an operation for septic or malignant condition may be a death warrant. An acute flood of secondary bleeding may start at any moment without any further notice.
- (h) Beware of too tight and too long application of a tourniquet which may lead to paralysis.
- (i) Morphia is one of the best treatments for shock accompanying the hæmorrhage and also helps to lessen it by quietening the patient.

### (2) Aneurysm

- (a) A pulsating cystic swelling in the course of a main artery is an aneurysm unless proved otherwise.
- (b) Main conditions to be differentially diagnosed are

- (a) Swellings adherent to a blood vessel
- (β) Vascular tumours
- (c) Most common predisposing cause of a spontaneous aneurysm is syphilis.
- (d) Under no circumstances an undiagnosed gluteal swelling should be aspirated.
- (e) The treatment of an aneurysm
  - (a) Clotting or excision
  - (β) Relief of pressure
- (f) Cause of failure after ligature operations for aneurysm  
Revascularization by collaterals.
- (g) Complication of ligature operation for aneurysm  
Post-operative gangrene
- (h) Aneurysm of common carotid presents in the neck  
Aneurysm of internal carotid rarely presents in the neck
- (i) ? Stroke in young patients (violent headache → rapid unconsciousness) Do the lumbar puncture. If C.S.F. is bloody it is a case of spontaneous rupture of congenital intracranial aneurysm.  
Small aneurysm is the commonest cause of isolated third nerve palsy
- (j) Ideal treatment of arteriovenous aneurysm  
Quadruple ligature + excision of the aneurysm  
Except in cavernous-carotid aneurysm where proximal ligature is done.
- (k) Aneurysmal varix is stationary varicose aneurysm is progressive.
- (l) In every case of varicose veins look for arteriovenous aneurysm.
- (m) In every case of arteriovenous aneurysm examine the heart.
- (n) Final test of arteriovenous aneurysm is to estimate the oxygen content of the blood from deep veins of the extremity as compared with the blood from other veins.
- (o) Ideal operation for an aneurysm is 'endo-aneurysmorrhaphy' by intrasaccular method though proximal ligature or excision with double ligature are the most practicable methods.
- (p) Always test the collateral circulation of a limb before tackling an aneurysm surgically
- (q) Preliminary intermittent temporary non-surgical compression of the parent artery is helpful before operation on an aneurysm, by developing collateral circulation.
- (r) Hunter's operation for an aneurysm predisposes to gangrene.

### (3) Arterial Thrombosis and Embolism

- (a) Arterial thrombosis and embolism is an important factor in the aetiology of gangrene, especially if collateral circulation is abnormal.
- (b) Embolus is more likely to produce gangrene than ligature of main artery as the secondary thrombosis from it spreads peripherally down the artery and its branches.
- (c) Every embolus which causes circulatory disturbance of a threatening character in either extremity should be removed by arteriotomy as soon as possible.
- (d) Arterial embolism syndrome
  - (a) Heart lesion or blood vessel disease
  - (β) Sudden pain along an artery
  - (γ) Circulatory failure in peripheral part
- (e) Except the popliteal; occlusion of larger arteries by thrombosis is not marked by sudden pain as in embolism.
- (f) Earlier the operation of embolectomy better the outlook. Embolectomy is unnecessary after 12 hours and below the bifurcation of brachial and popliteal arteries.
- (g) Sudden acute pain in a limb or abdomen in a vascular or cardiac patient ? embolism
- (h) A good arteriotomy is better than a bad embolectomy and has the added advantage of periarterial sympathectomy the ligature of main vein adds further to the safety of the limb.
- (i) Most common sites for emboli:
  - (a) Femoral artery at the adductor hiatus
  - (β) Femoral artery at the branching of profunda

### (4) Thrombo-phlebitis and venous thrombosis:

- (a) All forms of thrombo-phlebitis start as an inflammatory lesion of the vein wall leading to thrombosis
- (b) More than 80% of cases of post-operative thrombosis follow operations on the abdomen especially
  - (a) Appendix
  - (β) Gall bladder
  - (γ) Pelvic organs
- (c) Four main causes of thrombosis of veins
  - (a) Sepsis
  - (β) Trauma
  - (γ) Stasis
  - (δ) Altered blood
- (d) Most common clinical states of which vein thrombosis is a complication
  - (1) Post-operative
  - (2) Post-convalescent



- (3) Local sepsis
- (4) Septic abortion
- (5) Varicose veins

(e) Phlebitis of a surgically accessible and recognizable vein is the feeding focus of surgical septicæmia, which can be prevented by proximal ligation

(f) Superficial phlebitis is a safe lesion in an ambulant patient but becomes dangerous when patient stays in bed

**(5) Vasospastic diseases of the arteries**

(a) Three common diseases of peripheral arteries

- (1) Degenerative arteriosclerosis, atheroma
- (2) Thrombo-angiitis Buerger's disease
- (3) Vasospastic

(a) Primary

- (1) Raynaud
- (2) Acrocyanosis
- (3) Erythrocyanosis
- (4) Hyperhydrosis
- (5) Erythromelalgia

(b) Secondary

- (1) Infantile paralysis
- (2) Cervical rib
- (3) Peripheral embolism
- (4) Rheumatoid arthritis

(b) Vasospasm and vasodilatation is due to supply of vaso-constrictor and vasodilator hormones brought via stimuli

(A) General blood adrenaline histamine

(B) Local (a) Vaso-constrictor or dilator sympathetic  
(b) Reaction of arteriolar muscle

General vascular tone depends on the balanced activity of these factors

(c) Results of sympathetic ganglionectomy

(a) Raynaud good  
lumbar better than stellate

(b) Thrombo-angiitis 50%

(r) Arteriosclerosis relief only in early stages

(d) Only indications for sympathectomy in arterial disease

(a) Proved cases of uncomplicated and progressive vasospasm

(b) Temporary improvement in peripheral circulation

- (1) Preliminary to amputation
- (2) Aid to healing of circulatory or nervous ulcers

(e) Peripheral vaso-constrictors run along the somatic nerves and not along main vessels.



- (f) Sympathetic ganglionectomy destroys the power of peripheral arterioles to dilate as well as to constrict.  
 \* This loss of vasodilatation reaction constitutes the chief drawback to sympathetic operations.
- (g) Lumbar ganglionectomy gives far superior results than cervicodorsal does because in the former the preganglionic fibres are severed.
- (6) **Thrombo-angitis obliterans**
- (a) Raynaud affects hands of young women  
 Buerger affects feet of middle aged men
- (b) Thrombo-angitis obliterans or Buerger is a presenile, non-syphilitic, thrombo-obliteration of the deep vessels of the lower extremities of males with
- (a) Postural colour changes  
 (b) Obliteration of pulse  
 (c) Migrating phlebitis
- (7) **Diagnosis of circulatory disturbances of extremities**
- (a) Peripheral pulse  
 (b) Surface temperature at various levels  
 (c) Postural colour changes  
 (d) Histamine reflex  
 (e) Pachon's oscillometer  
 (f) X Rays simple arteriography  
 (g) Warm bath  $43^{\circ}$ - $45^{\circ}$ C. for 35 minutes for forearm
- ↓
- rise in toe temperature
- (h) Intravenous typhoid vaccine  
 (i) Spinal anaesthesia  
 (j) Posterior tibial anaesthesia (or Ulnar)  
 (k) Reactive hyperaemia test
- (8) Intermittent venous occlusion by a pneumatic cuff may be tried in peripheral arterial diseases
- (a) Thrombo-angitis obliterans  
 (b) Arteriosclerosis diabetic and non-diabetic  
 (c) Gangrene
- (8a) In arteriosclerosis and endarteritis, collateral circulation is more affected than in thrombo-angitis, diabetic arteritis and embolism and so gangrene is more common and surer and is the result of thrombosis or infection.
- Angle of circulatory efficiency is an index of the degree of arterial occlusion in circulatory disease.
- (9) Intermittent claudication is a symptom of muscular ischaemia and is due to
- (a) Arteriosclerosis  
 (b) Thrombo-angitis obliterans

It affects legs, arms and tongue

Sympathectomy is the best treatment of intermittent claudication.

(10) Arteritis includes

- (a) Etio
  - (1) Acute infective arteritis
  - (2) Chronic infective arteritis
  - (3) Syphilitic arteritis
  - (4) Atheroma and arteriosclerosis
  - (5) Diabetic arteritis
- (b) Age types
  - (1) Juvenile under 40
  - (2) Presenile 40-50
  - (3) Senile over 50

(11) In gangrene of a limb vasodilator response test will show whether the lesion is spastic or sclerotic

Simple vasodilator test is spinal anaesthesia

Positive test (a) Thrombo-angitis early cases

(b) Raynaud

Negative test Arteriosclerosis

(12) In every case of arterial obstruction, find out

- (a) Sclerotic factor
  - (a) Arteriosclerosis
  - (b) Thrombo-angitis obliterans
- (b) Spastic factor
  - (a) Raynaud
  - (b) Erythromelalgia

(13) If after warming the forearm in water at a temperature of from 43°-45 C. for 35 minutes, the surface temperature of the toe rises above 31.5°C. obliterative structural disease of the arteries of the lower extremities is absent.

(14) (a) Election of site for amputation in vascular gangrene

- (1) Pulse level
- (2) Postural tests colour heat, sensations pulse
- (3) Vasodilator response tests
- (4) Well above the infection
- (5) Arteriography
- (6) Peripheral puncture or incision with main artery compressed ? level of bleeding

(b) The site can be more distal if preliminary peri-arterial sympathectomy is done one week before amputation.

(c) Common sites of amputation in vascular gangrene of lower extremity

- (a) Toes
- (b) Midleg 6 inches below tibial tubercle
- (c) Lower thigh 3 inches above the knee

(15) Varicose veins

- (a) In every case of varicose veins, find out whether<sup>1</sup>  
or secondary

- (4) Varicose veins
- (5) Gradual arterial obliteration with inadequate collateral circulation
- (c) Sites for femoral vein ligation
  - (1) Scarpa below great saphenous entry
  - (2) Hunter in association with periarterial sympathectomy
  - (3) Popliteal below small saphenous entry
- (d) A proximal ligature should never be applied to a main trunk artery especially at a distance from the wound or aneurysm
- (e) Arteriotomy is better than simple ligation
- (f) Inferior vena cava may be ligated below the level of the renal veins.
- (g) Practically any of the main limb vessels may be ligatured in continuity without risk of gangrene, especially if the companion vein is also tied except in
  - (a) Severe lacerated injury
  - (b) Occlusion of collaterals
  - (c) Aneurysm
- (h) Simultaneous ligation of companion vein in ligation of main artery
  - Ind Inadequate collateral circulation
  - Contraind Adequate collateral circulation
- (i) Bleeding after puncture or incision of any position of peripheral arterial tree when the main trunk is compressed, is a sign of adequate circulation.
- (j) It is better to tie individual branches of popliteal than popliteal itself to avoid gangrene.
- (k) There is less danger of gangrene resulting from ligation of main artery in the upper limb, than in the lower
- (l) For ligation of a vein, silk is better than catgut
- (m) After ligation of an important vessel a careful watch must be kept on the circulation of tissues it supplies and bear in mind its possible complications
  - (1) Ischaemic myositis
  - (2) Gangrene
  - (3) Secondary haemorrhage
- (n) Ligation of iliac or common femoral } lead to  
 Ligation of sub-clavian } complications  
 Ligation of common carotid }
- (17) In arterial suture
  - (a) No part of media or adventitia should come in contact with blood
  - (b) Distal clamp must be released first
  - (c) Watch for leakage after release of the proximal clamp

(18) **Heparin treatment:** 10 units of heparin to 1 c.c. of saline intravenously

- Ind (1) Post-operative active thrombosis  
 (2) Phlebitis  
 (3) Embolism  
 (4) Operations on blood vessels  
 (5) Blood transfusion  
 (6) Coronary and cardio-vascular thrombosis

(19) (a) Chief indications for blood transfusion

- (1) Haemorrhage  
 (2) Haemolysis  
 (3) Defective coagulation  
 (4) Toxic blood  
 (5) Immuno-transfusion

(b) Citrate method is the best

- (a) Direct three-way syringe  
 (β) Indirect storage method

(c) Half an hour should be the least time for transfusion of 500-600 c.c.

(d) In every case direct cross agglutination tests between donor's blood and recipient's blood should be carried out.

(e) In multiple transfusions, every time do —

- (a) Cross agglutination test  
 (b) Anaphylaxis test

(f) Three stages of blood transfusion

- (a) Testing the blood  
 (β) Collecting and citrating  
 (γ) Infusing

(20) Places for infusion in infants —

- (a) Internal saphenous just anterior to internal malleolus  
 (β) Superior longitudinal sinus at the anterior fontanelle

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## CHAPTER VI

# THE LYMPHATICS AND LYMPH GLANDS

## I. TRAUMA

### TRAUMA TO THE THORACIC DUCT

#### (A) IN THE NECK

- Etiol** (1) Operations on the roof of the neck  
(a) Excision of inferior cervical glands  
(b) Thyroidectomy  
(c) Thymic tumours  
(d) Cystic hygroma  
(e) Pharyngectomy  
(2) Gunshot wounds, stabs  
(3) Fracture sternum or clavicle
- Clinic** (1) Chylorrhoea, chylocyst or chylous fistula  
(2) Chyle imbibition
- Diag** Serous exudate turning milky on taking fats
- Treat** (A) Immediate In operative or accidental trauma  
(1) Identification and ligature  
(2) Identification and anastomosis  
(B) Post-operative cases  
(1) Glycerine pack + pressure bandage  
(2) Ingestion of large quantities of cream  
↓ Reopening of the wound  
↓ Identification and ligature  
↓ Drainage

#### (B) IN THE THORAX TRAUMATIC CHYLOTHORAX

- Etiol** (1) External violence  
(a) Closed trauma  
(b) Fracture thoracic wall  
(2) Wounds  
(a) Operative  
(b) Stab  
(c) Gunshot
- Clinic** (a) Symptoms  
(1) History of injury with shock  
↓ (2) Latent period  
↓ (3) Crisis period  
(a) Shock  
(b) Dyspnoea with cyanosis  
(c) Semi-consciousness  
(d) Acetonaemia

- (b) Physical signs  
 (α) Of fluid in the tho  
 (β) Pressure signs  
 (c) Asthenia and inanition
- Diagnosis Aspiration
- Diff diag (1) Hydrothorax  
 (2) Hæmothorax  
 (3) Pyothorax empyema  
 (4) Pneumothorax
- Complications (A) Immediate  
 (a) Collapse of the lun  
 (b) Heart failure  
 (B) Remote inanition
- Treat (A) (1) Treatment of Shock and injuries  
 ↓ (2) Repeated pleural aspirations  
 ↓ (3) Intravenous aspirated chyle  
 ↓ (4) Carbohydrate fluid feeds  
 (B) Thoracotomy and drainage
- (C) IN THE ABDOMEN CHYLOUS ASCITES
- Etio (1) Stab wound of the upper abdomen  
 (2) Hard blow on the epigastrum
- Clinic (1) History or signs of trauma  
 (2) Signs of ascites free fluid in peritoneum  
 (3) Milky fluid on tapping  
 (4) Dehydration, inanition and asthenia
- Treat (1) Repeated tapping  
 (2) Saphenous vein—peritoneal anastomosis

## II. INFLAMMATION OF THE LYMPH VESSELS

### (1) ACUTE LYMPHANGITIS

- Etio (1) Infected trivial wounds  
 (2) Small septic foci  
 (3) Filariasis
- Pre-disp (1) Metabolic disease diabetes, nephritis  
 (2) Lack of resistance to streptococci
- Exciting Infection by streptococcus
- Special sites (1) Palm needle pricks of surgeons  
 (2) Soles thorn or nail pricks  
 (3) Elephantiasis
- Clinic (1) Cutaneous and subcutaneous red streaks  
 from a trivial septic focus to the regional  
 lymph glands.  
 (2) Lymphatic oedema  
 (3) Tenderness of regional lymph glands  
 (4) General marked toxæmia or septicæmia

- Compl (1) **Acute Lymphadenitis**  
 (2) Abscesses along the lymphatics  
 (3) Cellulitis  $\rightarrow$  gangrene  
 (4) Buritis with suppuration  
 (5) Septicæmia
- Treat (1) **Local antiseptic treatment of primary focus**  
 (a) Excision in toto  
 (b) Cauterization  
 (c) Dressings  
     Phenol 1%  
     Salicylic acid 2%  
     Camphor 3%  
     Lanoline to 3%  
 (d) Hot baths and Bier's congestion  
 (e) Rest in splint or plaster bed
- (2) **General**  
 (a) Sulphonamide group  
 (b) Antiserum: 50  $\rightarrow$  30  $\rightarrow$  20  $\rightarrow$  10 c.c.  
 (c) Iron and vitamins

## (2) CHRONIC LYMPHANGITIS

- Fæc Recurrent streptococcal infections  
 (a) Erysipelas Chronic and recurrent  
 (b) Filariasis  
 (c) Primary chancre  
 (d) T.B. associated with T II ulcers
- Clinic (1) Chronic lymphatic oedema with recurrent attacks of inflammation  
 (2) Hypertrophy of skin and subcutaneous tissues
- Compl Elephantiasis

## III. NEW GROWTHS OF THE LYMPH VESSELS

### LYMPHANGIOMA:

#### (A) CAPILLARY OR NAEVOID LYMPHANGIOMA:

- Varieties (a) Localized  
 (b) Diffuse macrocheilia, macroglossia
- Treat (a) Radium  
 (b) Deep X Ray  
 (c) Electrolysis  
 (d) Surgical excision

#### (B) CAVERNOUS LYMPHANGIOMA:

- Clinic Soft, compressible, sponge-like  
 Resembles cavernous naevi except bruit and pulsations  
 Bluish discolouration

**(C) CYSTIC LYMPHANGIOMA : CYSTIC HYGROMA :**

<b>Etio</b>	Children
<b>Origin</b>	Vestigial rests from jugular sacs
<b>Sites</b>	Neck, axilla, pectorals, groin, sacral retroperitoneal
<b>Path</b>	Conglomeration of endothelial cysts with serous fluid
<b>Clinic</b>	<p>(A) <b>Multilocular</b>            Bluish transparent thin walled multilocular cyst with clear serous fluid in the lower part of the neck under the sternomastoid</p> <p>(B) <b>Unilocular</b>            Solitary lymph cyst            Smooth, fluctuating globular swelling in the neck</p>
<b>Diff diag</b>	of cystic hygroma in the neck (1) Cavating tuberculous gland (2) Branchial cyst (3) Encysted lipoma (4) Aneurysm
<b>Compl</b>	(1) Recurrent streptococcal inflammation (2) Lymphorrhea (3) Adhesions to surrounding parts
<b>Treat</b>	<p>(A) <b>Multilocular</b>            (a) Injections of sod. morrhuate            (b) Deep X Rays            (c) Radium</p> <p>(B) <b>Unilocular</b>            (a) Aspiration                ↓ Injection of quinine urethane 3-5 c.c.            (b) Excision</p>

**IV LYMPHATIC OBSTRUCTION**

<b>Etio</b>	(1) <b>Congenital</b> Lymphangectasis (2) <b>Post-operative</b> Removal of a group of glands (3) <b>Traumatic</b> Obliteration of lymphatics by a scar (4) <b>Inflammatory</b> Obliterative lymphangitis (a) Filariasis (b) Puerperal white leg (c) Facial erysipelas (d) Lupus (5) <b>Neoplastic</b> Carcinomatous permeation (a) Brawny arm (b) Peau d orange (6) <b>Parasitic</b> Filariasis
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- Clinic** (1) **Lymphatic oedema** Pitting on pressure  
 ↓ (2) **Brawny solid oedema**  
 ↓ (3) **Hypertrophy of the skin and subcut tissues**  
       **(elephantiasis)**  
 ↓ (4) **Lymphorrhea**
- Compl** (1) **Heaviness**  
 (2) **Recurrent streptococcal inflammations**  
 (3) **Malnutrition of skin** ulcers, ocrema  
 (4) **Nerve and muscle paralysis**
- Treat** (1) **Conservative**  
       (a) **Postural**  
       (b) **Physiotherapy**  
       (c) **Antistrepto. serum**  
       (d) **Sulphonamide group**  
 (2) **Operative**  
       (a) **Handley's lymphangioplasty**  
       (b) **Kondoleon's** excision of wedgeshaped  
           strips of skin, subcutaneous tissues and  
           deep fascia  
       (c) **Excision of all affected tissues** (scrotum  
           and penis)  
       (d) **Amputation**

## V ACUTE LYMPHADENITIS

- Etiol** (1) **Acute septic focus in the catchment area**  
 (2) **Secondary to chronic Lymphadenitis** T B.  
 (3) **Bubonic Plague**  
 (4) **Glandular fever** infective mononucleosis
- Clinic** (1) **Soreness and stiffness in the region**  
 ↓ (2) **Acutely tender rapid, firm, discrete enlargement**  
 ↓ (3) **Paradenitis** fixation to one another  
 ↓ (4) **Cellulitis**  
 ↓ (5) **Abcess formation**  
 ↓ (6) **Bursting**  
 ↓ (7) **Sinus formation**
- Compl** (A) **Local**  
       (a) **Abscess**  
       (b) **Secondary hemorrhage**  
 (B) **General**  
       (a) **Toxaemia**  
       (b) **Paemina**  
       (c) **Septicaemia**  
**Sequelae**  
       (a) **Chronic lymphadenitis**  
       (b) **T B lymphadenitis**

(A) **Conservative**

- Treat (1) **Treatment of local focus**  
 (2) **Local** Rest and counter irritation to the glands  
 (3) **General** Sulphonamide group  
 Specific antiserum

(B) **Operative** Incision and drainage with hypertonic dressings

- Post. compl (1) Chronic lymphadenitis  
 (2) Ulceration unhealing in situ  
 (3) Lymphatic oedema in catchment area

*Special groups*(1) **DEEP CERVICALS**

Etio **Septic focus** Face oral cavity pharynx

- Sp Compl (a) **Cervical cellulitis**  
 (b) **Oedema glottis**  
 (c) Mediastinal abscess  
 (d) Internal jugular vein thrombosis  
 (e) Ulceration into internal carotid

Treat Drainage by Hilton's method

(2) **SUBMAXILLARY GLANDS:**

Etio **Infected tooth, tongue, cheek**

Clinic **Inflammatory brawny swelling in the submaxillary area**

- Diff diag (1) **Ludwig's angina**  
 (2) **Acute perio titis or osteomyelitis jaw**

Compl **Oedema of the glottis**

Treat Incision and drainage by Hilton's method

(3) **RETRO-PHARYNGEAL GLANDS:**

Etio **Pharyngeal sepsis**

Clinic **Acute retro-pharyngeal abscess**

- (a) **Crowing respiration**  
 (b) **Attitude**  
 (c) **Bulging behind soft palate**

Compl (a) **A phytia**  
 (b) **Aspiration pneumonia**

Treat (a) **Rose's head low position**

↓ (b) **Drainage by Hilton's method into pharynx**

(4) **AXILLARY GLANDS**

Etio (1) **Sepsis from the hand** Whitlow

**Lymphangitis**

(2) **Sepsis from the breast** **Acute mastitis**

Clinic **Tender inflammatory mass in the axilla**

- Treat (1) Conservative  
 (2) Operative  
     (a) Incision (α) along the floor of the axilla  
                   (β) away from the lateral wall  
                   (γ) parallel to important structures  
     (b) Hilton's method  
     (c) Sling to the arm

(5) **INGUINAL GLANDS:** Most common site

- Eti (a) Venereal sepsis  
      (b) Perineal sepsis  
      (c) Gluteal sepsis  
      (d) Inferior extremity (foot) sepsis  
 Clinic (a) Tender inflammatory mass  
           (α) Supra poupart transverse  
           or (β) Infra poupart vertical  
      (b) Fluctuating abscess Bubo  
 Treat (a) Conservative  
      (b) Operative  
           Vertical incision and drainage

(6) **POPLITEAL GLANDS:**

- Eti Sepsis from  
     (1) the outer side and the sole of the foot  
     (2) lateral and posterior sides of the leg  
 Clinic Tender inflammatory popliteal swelling  
 Diff. diag Inflamed or thrombosed popliteal aneurysm  
 Treat (1) Conservative  
      (2) Operative incision in front of biceps tendon

(7) **ILIAC GLANDS:**

- Eti Sepsis from the foot (especially in children)  
 Clinic (a) Deep tender mass } in the iliac fossa  
       ↓ Fluctuating swelling }  
      (b) Flexion of the hip } psoas contracture  
 Diff. diag (a) Acute appendicitis  
           (b) Acute psoas abscess  
           (c) Parametritis  
 Treat (a) Conservative  
      (b) Operative  
           Incision above and parallel to outer half of the  
           Poupart, just above the ant. sup. iliac spine  
           & then parallel to iliac crest (Astley Cooper)

(8) **ACUTE ABDOMINAL LYMPHADENITIS:**

- Eti Children under 15  
 Path Progenesis via  
     (a) Gut  
     (b) Blood

Clinic	(a) Acute pseudo-appendicitis
	(b) Recurrent subacute abdomen with wasting
Diff. diag	Other causes of acute abdomen (inflammatory)
Compl	Bursting into general peritoneal cavity
Treat	(1) Exploratory laparotomy
↓	(2) Appendicectomy and peritoneal toilette
↓	(3) Biopsy of a gland

## VI CHRONIC LYMPHADENITIS

### (A) SEPTIC CHRONIC LYMPHADENITIS

Etio	(a) Chronic septic focus in the catchment area
	(b) Incomplete resolution of acute lymphadenitis
Clinic	(1) Moderately enlarged Slightly tender Mobile and discrete } lymph glands
	(2) No periadenitis
Diff. diag	From specific glandular enlargement
Compl	Tuberculosis
Treat	Conservative
	(a) Treatment of primary focus
	(b) Counter irritation
	(c) General tonics

### (B) TUBERCULOUS LYMPHADENITIS

Etio	Age Children and adolescents
	Incidence Mohammedan women
	Predisposer Chronic septic focus in catchment area
	↓ Septic chronic lymphadenitis
Path	Bacteriology Bovine type
Routes	(a) Lymphatics tubes mesenterica apical glands
	(b) Blood
Stages	(a) Tubercle formation
↓	(b) Fibrosis
	(1) glandular
or	(2) periglandular
or	(c) Caseation
	(1) Cold abscess
	↓ (2) Sinus
Morph. anat	Degenerated tubercular bacilli
	Endothelial and giant cells
	Lymphocytes
Varieties	(1) Caseous Collar-stud abscess
	(2) Lymphoid Pseudo-Hodgkin
	(3) Fibrous Hard matted glands

**Clinic (A) TYPES:**

- (1) **Localized** Enlargement of local gland with primary focus in catchment area (indistinguishable from chronic septic lymphadenitis)
- (2) **Regional** Enlargement of regional glands
- (3) **Spreading** Further stage to (2)
- (4) **Diffuse** Enlargement of more than one group not contiguous
- (5) **Complicated** Association with other T B. foci
  - (a) Phthisis
  - (b) T B joints

**(B) STAGES:**

- (1) **Latency** Indolent, painless slow palpable (chronic septic lymphadenitis)
- ↓ (2) **Hyperplasia** Periadentitis with matting
- ↓ (3) **Caseation** Fluctuation cold abscess
- ↓ (4) **Infection**
  - (a) Acute cellulitis
  - ↓ (b) Acute abscess
- ↓ (5) **Sequelae**
  - (a) Tuberculous sinus or ulcer
  - (b) Fibrosis and calcification
  - (c) General T B. toxæmia

- Special Signs**
- (1) **Blood**
    - (a) Complete blood count
    - (b) Wassermann or Kahn
  - (2) **X Rays** lungs bones, abdomen
  - (3) **Microscope**
    - (a) Caseous discharge
    - (b) Biopsy
  - (4) **Specific**
    - (a) Tuberculin
    - (b) Guinea pig

**Treat (A) Preventive:**

- (1) Care of the milk
- (2) Removal of septic foci
- (3) Isolation from T B
- (4) Periodic medical examinations
- (5) Attention to general health

**(B) Curative****Indications****(1) Age**

- (a) Children upto 2 } conservative
- (b) Older children } radical
- (c) Adults } radical
- (d) Old } conservative

**(2) Economic condition**

- (a) Good } conservative → radical
- (b) Bad } radical

**(3) Extent and type of the disease****(A) Conservative**

- (a) Localized early reacting
- (b) Generalized complicated
- (c) Bad general health

**(B) Radical****(1) Local glandular mass**

- (a) Not reacting to conservation
- (b) Progressing to other groups
- (c) Caseating
- (d) With secondary infection
- (e) Residual after aspiration of cold abscesses
- (f) Large & calcified

**(2) Absence of generalized or complicating T. B.****(3) Good general health****Contraindications for radical treatment**

- (1) Blood borne widespread T. B.
- (2) Children below 2 and seniles
- (3) Bad general health
- (4) Very early stage
- (5) Acute periadenitis T. B. cellulitis
- (6) Metabolic diseases pregnancy

**(1) Conservative treatment****(A) Removal of septic catchment focus**

Tonsils and adenoids

**(B) Sanatorium treatment****(C) General tonics** Cod-liver oil vitamins, iron**(D) Local adjuvants****(a) Fomentations**

- (a) T. B. Periadenitis or cellulitis
- (b) Secondary infection

**(b) Counter irritants** Early mild cases**(c) Aspiration** Cold abscess

- (d) Heliotherapy - Sun bath at
- (e) Tuberculin
- (f) Deep X-rays
  - Contraind (a) Calcification
  - (b) Caseation
  - (c) Secondary infection
- (g) Ultra-violet
  - Ind (a) Sinuses and ulcers
  - (b) Scattered widespread enlargement of glands
  - (c) Post-operative

(2) Operative treatment

(A) Aspiration

Ind T B. cold abscess

(B) Incision and drainage

Ind T B. abscess with secondary infection

After treat (a) Immobilization

(b) X ray and ultra violet

(c) Dissection of residual glands

(C) Incision, evacuation and curettage

Ind Caseation with cold abscesses

(D) Intracapsular enucleation

Ind Multiple caseating foci

(E) Radical Excision

Ind (a) Failure of conservative operations

(b) One group affected

(c) No generalized or complicating focus

(d) General health good

(3) Palliative treatment

Ind (a) Generalized T B. glands

(b) Complicating T B focus

(c) Bad general health

(d) Progressive and late stage

(A) Ultra violet exposures

(B) Deep X Ray therapy

(C) Local minor surgical procedures if required

(D) General conservative anti-tuberculous treatment

## TUBERCULOSIS OF DIFFERENT LYMPH GLAND GROUPS

### (1) FACIAL GROUP: Posterior and anterior auricular

Etio Septic ear sepsis scalp

Exo (1) Septic tonsils and adenoids  
Upper anterior cervicals  
(2) Septic scalp posterior cervicals  
(3) Apex lung  
(4) T B axillary glands } inferior cervicals

- (1) Pre-operative scalp excision
- (2) Anaesthesia morphine-atropine  
or omnopon-scopalamme  
↓  
general anaesthesia
- (3) Position sand bag under the shoulder  
face to the opposite side

Save (a) Great occipital nerve  
(b) Occipital artery

Incision transverse midway between  
hyoid and mandible

Incision (a) Symphysis  $\rightarrow$  hyoid  $\rightarrow$  1  
below jaw angle  
or (b) Along lower border of the  
Mx

T10	(a)	Facial vessels
	(b)	Wharton's Duct

Incision	(a)	Skin crease
	(b)	Deep along anterior sternomast. border



- |      |  |
|------|--|
| Save | (a) Superficial sensory nerves               |
|      | (b) Spinal accessory nerve                   |
|      | (c) Facial cervical branch                   |
|      | (d) Hypoglossal nerve                        |
|      | (e) Vessels carotid artery<br>int. jug. vein |
| Tie  | (a) External jugular vein                    |
|      | (b) Common facial vein                       |
|      | (c) Int. jug. vein (if necessary)            |

(F) Lower deep cervical :

**Incision** - Crease 2 inches above clavicle

- |      |     |                               |
|------|-----|-------------------------------|
| Give | (a) | Spinal accessory nerve        |
|      | (b) | Vagus nerve                   |
|      | (c) | Brachial plexus with branches |
|      | (d) | Int. jug vein                 |
|      | (e) | Thoracic duct                 |
| The  | (a) | Ext. jug vein                 |
|      | (b) | Transverse cervical vessels   |
|      | (c) | Suprascapular vessels         |

- After treat (1) Anti shock  
(2) Immobilization of head and neck  
(3) Sitting posture  
(4) Removal of tubes after 36 hours

- Compl (1) **Hæmorrhage**  
**Never cut tissues under tension**  
**Never cut without previous clamping**  
**Never tear away**  
 (2) **Air embolism** flood the wound with saline  
 (3) **Injury to thoracic duct**  
 pressure bandage  
 reopen and ligature  
 (4) **Injury to important nerves**

## (3) MEDIASTINAL OR TRACHEO-BRONCHIAL GROUP

	Childhood bovine	Adult human
1	1	1
2	1	1
3	1	1
4	1	1
5	1	1
6	1	1
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100	1	1

- Clinic** (a) General toxæmia and cachexia  
(b) Intermittent pyrexia  
(c) Paroxysmal cough  
(d) Parosteal cold abscess  
(e) X-Ray

- Comp1 (A) Abscess formation with pressure  
(a) Trachea dyspnoea  
(b) Bronchus lung collapse consolidation  
(c) Oesophagus dysphagia  
(d) Recurrent laryngeal altered voice  
(e) Sin. vena cava prominent veins

- .. (f) Vagus tachycardia
- (g) Sympathetic abnormal pupil
- (h) Thoracic duct chylothorax

(B) Abscess formation with rupture

- (a) Trachea aspiration pneumonia
- (b) Pleura empyema
- (c) Pericardium pyopericardium
- (d) Oesophagus pyoenteria
- (e) Post. mediastinum cold abscess → sinus
- (f) Ant. mediastinum cold abscess → sinus

Treat Conservative

(4) AXILLARY GROUP:

- Eti (a) Part of generalized T B infection
- (b) Extension from cervicals
- (c) Secondary to septic chronic inflammation from catchment area

Treat (1) Generalized conservative

(2) Local primary excision

Incision Parallel to and behind ant. axillary fold

Save (a) Nerves

anterior thoracic  
long subscapular  
thoraco-dorsal  
long thoracic  
brachial cords and branches

(b) Axillary vessels

(5) INGUINAL GROUP Rare

Eti (a) Secondary to septic chronic lymphadenitis

(b) Bloodborne

Diff diag (a) Septic glands

(b) Venereal glands

Treat (1) Conservative in early stages

(2) Excision

Incision (a) Transverse supra-poupart

or (b) Vertical along saphenous vein

or (c) Curved flap

Save (a) Arteries external iliac and femoral

(b) Veins iliac and femoral

(c) Nerves femoral with branches  
abdominal

(6) MESENTERIC AND RETRO-PERITONEAL GROUPS:

Eti

Age Children

Source (a) Primary

(b) Secondary intestines, lungs

Path	(a) Caseation → suppuration → peritonitis
	(b) Calcification
Clinic	(a) Tender mass
	(b) Cystic swellings
	(c) X Ray shadows
Clinical types	(1) Acute Acute abdomen in cachectic patient
	(2) Chronic Chronic abdomen in " "
	(3) Residual
	(a) Colics and intestinal obstruction
	(b) Abdominal mass or cystic tumour
Diff. diag	(1) Acute abdomen
	(2) Chronic abdomen surgical dyspepsia
	(3) Abdominal tumour or cyst
	(4) Stone shadows
Complications	(1) Adhesion effects Intestinal obstruction
	(2) Pressure effects Ascitis
	(3) Rupture effects Peritonitis
Treat	(1) Conservative
	(2) Operative if caseation or complications

## (B) SYPHILITIC LYMPHADENITIS :

### (1) PRIMARY CHANCRE

- (1) Genital chancre discrete and shotty
- (2) Extra-genital chancre indurative oedematous

### (2) SECONDARY SYPHILIS :

- (a) Generalized, painless discrete shotty
- (b) No periadenitis
- (c) No caseation

### (3) TERTIARY :

- (a) Gumma rare
- (b) Secondary to infection from broken down gumma

## VII LYMPHO-GRANULOMA : HODGKIN'S DISEASE

- Def. (1) Enlargement of lymphatic glands, liver and spleen
- (2) Associated with anaemia
- (3) In young adult males
- (4) Due to chronic progressive hyperplasia of haematopoietic tissues

Etho Males in third and fourth decades

Path (1) Theories

## (A) Infective

- (a) Special form of tuberculosis
- (b) Spirochaetal
- (c) Pleomorphic diphtheroid
- (d) Ultra microscopic virus

## (B) Granuloma : Chronic progressive hyperplasia of haematopoietic tissues

## (C) Lympho-blastoma

## (2) Morph. anat. cellular hyperplasia of haematopoietic tissues

## (3) Histology

- (a) Reticular cells
- (b) Endothelial cells
- (c) Multinuclear giant cells
- (d) Eosinophils
- (e) Fibroblasts or fibrous tissue

## Clinic (1) Enlarged glands

Firm elastic, discrete mobile

- (a) Progresses from group to group
- (b) No periadenitis
- (c) No caseation

## (2) Enlarged liver and spleen

## (3) Secondary anaemia (microcytic)

## (4) Pel-Epstein Bouts of fever

## (5) Cutaneous : pigmentation, pruritus, eruptions

## (6) Pressure signs

- (a) Nerves neuralgia
- (b) Veins effusion
- (c) Lymphatics oedema and chylous effusion
- (d) Bile jaundice
- (e) Spinal cord—compression myelitis

## (7) Bone pathological fracture

## Clinical varieties

## (A) DEGREE :

- (a) Acute type
- (b) Chronic type
- (c) Latent type

## (B) SITE :

- (a) Generalized Enlarged glands
- (b) Thoracic Dyspnoea, cyanosis, effusion
- (c) Abdominal : Pain, jaundice, ascitis
- (d) Splenic : Large spleen
- (e) Hepatic Large liver
- (f) Retroperitoneal : Backache

Diagnosis	(a) Biopsy
	(b) Gordon's biological test
	Encephalitis in rabbits after intra-cerebral injection of affected gland emulsion
Diff diag	(a) T B glands
	(b) Syphilitic glands
	(c) Lymphatic leukemia
	(d) Lymphosarcoma
Compl	(a) Pressure signs
	(b) Sarcoma
Prognosis	Fatal within three years
Treat	(1) Intravenous salvarsan
	(2) X Rays and Radium
	(3) Local excision
	Ind (a) Biopsy
	(b) Localized group affected
	(4) Specific sera

## VIII. NEW GROWTHS OF LYMPHATIC GLANDS

### (1) LYMPHOSARCOMA

Path	(a) Microscopic small round celled
	(b) Spread
	(a) Local infiltration
	(b) Lymphatic
Clinic	Rapidly progressive glandular tumour infiltrating widely
Compl	(a) Adhesions to, infiltrations into and pressure upon important structures
	(b) Fungations and ulcerations
	(c) Haemorrhage
	(d) Cachexia
Treat	(1) Deep X Ray therapy
	(2) Radium
	(3) Coley's treatment

### (2) SECONDARY CARCINOMA

Anatomy	(1) Visceral lymphatic system
	(2) Parietal lymphatic system
	(A) Fascial Lymphatics six areas
	(a) Two cervical
	(b) Two axillary
	(c) Two inguinal
	(B) Skin lymphatics
	areas of half inch diameter connected via fascial lymphatics
	(C) Muscular lymphatics
	drain into fascial lymphatics

**'Pathology (A) Primaries :**

- (1) Carcinoma
- (2) Melanoma malignum
- (3) Lymphosarcoma
- (4) Teratoma malignum

**(B) Invasion**

- (1) Lymphatic permeation
- (2) Lymphatic embolism
- (3) Direct infiltration

**Clinic (1) Primary in catchment area**

- (a) Detectable
  - (a) Primarily
  - or (β) Secondarily
- (b) Undetectable
  - (a) Retrogressed primary
  - or (β) Deep or latent primary

**(2) Glands : Progressive infiltrative enlargement**

- (a) Rapid or slow
- (b) Hard or soft

**Comp! (a) Adhesions to, infiltration into or pressure upon important structures**

- (b) Fungation and ulceration
- (c) Haemorrhage
- (d) Cachexia

**Treat (1) Surgical excision**

- (2) Deep X Rays
- (3) Radium

**Special important glands in carcinomata of important organs****(1) BREAST:****(A) Internal mammary** Radium implantation**(B) Supra-clavicular :**

- (a) Radium
- (b) Excision

Ind Carcinoma in upper quadrant

**(C) Apical axillary**

Ind Must be carefully removed in each case

**(D) Superior mediastinal**

Path Secondary to Internal mammary

Clinic Retrosternal pressure effects

**(2) TESTIS: (A) Para-aortic**

- (1) At the level of renal veins
- (2) Along the oesophagus

**(B) Supra-clavicular**

**(3) STOMACH:**

Three lymph regions of the stomach

- (a) Hepatic
- (b) Splenic
- (c) Coronary

**(4) TONGUE**

- (a) Apical Submental bilateral cervical
- (b) Marginal Submaxillary superior cervical
- (c) Posterior Bilateral superior deep cervical
- (d) Central Bilateral superior and inferior cervical

**(5) CHEEK**

- (a) Parotid
- (b) Preauricular
- (c) Submaxillary
- (d) Tonsillar
- (e) Main cervical chain

**(6) RECTUM:**

- (a) Inguinal primary below the white line
- (b) Mesorectal
- (c) Internal and external iliac
- (d) Para-aortic
- (e) Supraclavicular

**(A) EXCISION OF CERVICAL GLANDS FOR SECONDARY CARCINOMA**

Anaesth (a) Regional intervertebral 2, 3 4 C  
(b) General

Tech (A) Unilateral block dissection Cris

- (a) Incision trapezoid
- (b) Dissection of flaps
- (c) Excision from below upwards of
  - (1) Deep fascia with cellular tissues
  - (2) Submaxillary salivary gland
  - (3) Lower pole of parotid gland
  - (4) Sternomastoid
  - (5) Internal jugular vein
  - (6) Glands
    - (a) Submental
    - (2) Submaxillary
    - (7) Superior cervical
      - (a) Superficial
      - (b) Deep
    - (8) Inferior cervical

(d) Save main nerves and arteries

(e) Ligate the artery supplying the primary

**(B) Bilateral Block-Dissection**

As in A but avoid ligature of internal jugular vein or postpone it for 3 weeks on the other side

**(B) EXCISION OF AXILLARY GLANDS FOR SECONDARY CARCINOMA**

- (a) Incision axillary part of breast incision
- (b) Division of great pectoral
- (c) Division of small pectoral
- (d) Division of costo-cornoid membrane from clavicle
- (e) Clearing of axilla from apex downwards  
from without inwards
- (f) Save only
  - (1) Nerve of Bell
  - (2) Long subscapular nerve
  - (3) Superior thoracic artery
  - (4) Main nerves and vessels

**(C) EXCISION OF INGUINAL GLANDS FOR SECONDARY CARCINOMA**

- (a) Incision (1) T-shaped  
(2) U-shaped
- (b) Reflection of flaps
- (c) Dissection of deep fascia with glands
  - (a) Transverse superficial chain
  - (b) Vertical superficial chain
  - (c) Deep glands
  - (d) External iliac glands
- (d) Save
  - (a) Femoral vessels
  - (b) Femoral nerve

**(3) SECONDARY MELANOMA MALIGNUM**

Path	Dissemination by	into
	(1) Lymphatic permeation	the trunk lymphatics
	(2) Lymphatic embolism	the regional lymph nodes
	(3) Blood stream	anywhere lungs liver brain, bones, etc.
Treat	(1) Excision of trunk lymphatics with deep fascia in which they run from the primary to the glands	
	+ (2) Excision of the regional glands with deep fascia around them	
	Contra-ind blood metastases	

**IX. OTHER CAUSES OF ENLARGED LYMPH GLANDS****(1) LYMPHATIC LEUKAEMIA**

- Clinic
- (a) Generalized enlargement of lymph glands
  - (b) Enlargement of spleen
  - (c) Anaemia



Sign Blood exam. enormous leucocytosis with relative enormous lymphocytosis

(2) STILL'S DISEASE:

- Clinic (a) Children  
(b) Generalized enlargement of lymph glands  
(c) Enlargement of spleen  
(d) Anaemia  
(e) Multiple osteoarthritis

(3) GLANDULAR FEVER: Infectious Mononucleosis:

Def. Acute febrile and infectious adenitis with increase in mononuclear cells of the blood

Etiol Age (a) School children  
(b) Young adults

Path Infection (a) Virus  
(b) Protozoan

Entry (a) Throat  
(b) Respiratory tract  
(c) Digestive tract

Morb. anat (a) Reticulo-endothelial hyperplasia  
(b) Mononucleosis

Clinic (A) Juvenile  
(a) Febrile stage remittent  $\rightarrow$  intermittent  
(b) Adenitis (a) cervical (B) bronchial (y) mesenteric, rapid, painless, discrete, non-inflammatory but tender  
(c) Enlargement of spleen

(B) Adult:  
(a) Febrile stage three weeks  
(b) Enlarged glands

Signs (1) Blood  
(a) Leucocytosis 40,000  
(b) Mononucleosis 40%  
(2) Paul Bunnell reaction

Diff. diag (A) Septic states  
(a) Tonsillitis  
(b) Mumps  
(c) Enteric  
(d) Plague  
(B) Gland affections:  
(a) Septic  
(b) T.B.  
(c) Syphilis  
(d) Hodgkin  
(e) Leukemia

(C) Referred pressure symptoms:  
(a) Whooping cough  
(b) Spinal cervical caries  
(c) Appendicitis

Treat Ultra-violet exposures

## X. IMPORTANT POINTS

- (1) Trauma
  - (A) Causes of traumatic chylothorax
    - (a) External violence
      - (a) With fracture
      - (β) Without fracture
    - (b) Wounds
      - (a) Operative
      - (β) Stab
      - (γ) Gunshot
  - (B) In traumatic chylothorax, effusion never occurs immediately after injury there is a latent period of 2 to 6 days.
  - (C) Watery discharge from the wound in operations on the neck root ? trauma to thoracic duct.
- (2) Acute lymphangitis
  - (a) In acute lymphangitis cellulitis, etc. look for association with metabolic diseases as an aggravating or predisposing factor
  - (b) Every lymphangitis focus is a potential source of septicemia.
  - (c) Under no circumstances should incisions be made into areas of lymphangitis or subcutaneous cellulitis, unless it is clear that there are definite local collections of pus which require to be evacuated.
  - (d) No incisions into spreading cellulitis.
  - (e) In dealing with streptococcal or any septicemia or toxemia, real or potential general treatment should always precede the local no local interference should be allowed before the circulation is saturated with antiserum, which is ready to neutralize the toxins set free by the mechanical irritation of the local treatment.
- (3) Lymphatic obstruction
  - (a) Lymphatic obstruction is a valuable sign in
    - (a) Carcinoma
    - (β) Filariasis
  - (b) Lymphatic edema due to obstruction is a common sequela of excision of lymph glands or trunk lymphatics.
- (4) Lymphadenitis

- |     | <i>Group</i>   | <i>Catchment</i>                               |
|-----|--|--|
| (a) | (1) Upper cervicals  | face, oral cavity larynx and pharynx           |
|     | (2) Lower cervicals  | Three T's teeth, tongue, tonsils               |
|     | (3) Posterior cervicals  | lung apex, thyroid, axilla and upper extremity |
|     | (4) Axillary   | scalp  |
|     | (5) Inguinal   | breast, upper extremity lungs                  |
|     |  | genitals, perineum, lower extremity            |
| (b) | Do not forget bubonic plague in a case of acute lymphadenitis  |  |
| (c) | Signs of acute appendicitis in children under 15 with no history of vomiting look for septic focus on the foot   |  |
|     | ? acute iliac lymphadenitis  |  |
| (5) | Tuberculous lymphadenitis  |  |
| (a) | Chronic septic glands not going down within three months of the removal of primary focus in catchment area, are tuberculous, especially if they tend to break down.  |  |
| (b) | Tuberculosis enters the human portals by three routes  |  |
|     | (1)  | Pharynx tonsils and adenoids                   |
|     | (2)  | Bronchial tree                                 |
|     | (3)  | Last part of the ilium                         |
| (c) | In every case of tuberculous lymph glands, find out and treat any septic focus in the catchment area.  |  |
| (d) | With the exception of pyogenic infection, tuberculosis is the commonest cause of enlarged cervical glands syphilis and malignant metastases are other common causes. |  |
| (e) | Pathological varieties of T. B. glands neck  |  |
|     | (a)  | Caseous abscesses                              |
|     | (b)  | Lymphoid discrete swellings                    |
|     | (c)  | Fibrous matting                                |
| (f) | Tonsils and adenoids should be removed in every case of T. B. cervical glands, even if they do not seem to be diseased.  |  |
| (g) | Differential diagnosis between a collar-stud abscess and inflamed branchial cyst.  |  |
| (6) | (a) Operations for T. B. glands neck --  |  |
|     | (1)  | Aspiration of caseous material                 |
|     | (2)  | Incision and drainage                          |
|     | (3)  | Incision, evacuation and curettage             |
|     | (4)  | Intra-capsular enucleation                     |
|     | (5)  | Radical excision.                              |

- (b) In collar-stud abscess, enlarge the fascial hiatus and scrape out the underlying tuberculous gland.
  - (c) All incisions in the neck for removal of lymph glands, should be transverse, along the anatomical creases and along the lines of stress; there is no mass of cervical glands, however large, that cannot be removed through a transverse incision.
  - (d) There should be no incision within one finger's breadth from the mandibular angle (danger to cervical branch of facial nerve)
  - (e) Sternomastoid branch of the occipital artery is a good guide to spinal accessory nerve, which runs deep to it.
  - (f) Avoid breaking through a caseous gland and infecting the cellular tissues of the neck by tuberculous debris.
  - (g) In neck operations, nothing must be cut which is not identified, do not cut any tissues under tension and without preliminary clamping
  - (h) It is better to leave infection behind than to injure any important nerve trunk.
- (7) New growths
- (a) Supraclavicular adenopathy
    - (1) Carcinoma breast
    - (2) Carcinoma oesophagus
    - (3) Carcinoma thyroid
    - (4) Carcinoma abdominal
    - (5) Carcinoma testis.
  - (b) Systematic removal of all possible affected glands is imperative in all malignant tumours, except
    - (1) Rodent ulcer
    - (2) Sarcomata of low malignancy
    - (3) Carcinoma in lupus
    - (4) Carcinoma in scar.
  - (c) In breast cancer enlarged axillary glands are an indication of simultaneous affection of the internal mammary glands.
  - (d) Enlarged gland in the omohyoid triangle may be the first clinical indication of an unobserved testicular growth.
  - (e) Lymphatics of the tongue decussate freely across the midline; for growths anywhere on the tongue, except posterior two-thirds of lateral margins, bilateral gland excision is indicated.
  - (f) Efferent lymphatics of the tongue have a lower destination further forward they arise in the tongue. The disease spreads rapidly along the glands of the main chain.

- (g) Growths of the anal canal below the white line metastases in the inguinal glands on both sides.
- (h) Removal of all the draining glands must be done in
- (1) Sarcoma tongue
  - (2) Sarcoma testis
  - (3) Sarcoma tonsils
  - (4) Sarcoma breast
  - (5) Melanotic sarcoma.

It may not be done in fibrosarcoma

- (8) (a) In every case of either (1) enlarged lymph glands or (2) enlarged liver or (3) enlarged spleen, examine for the enlargement of all. Examine blood in each case.
- (b) Discovery of non-inflammatory enlargement of solitary lymph glands in unusual situations think of chronic lymphatic leukaemia.
- (c) Biopsy is the most important and certain step in the diagnosis of a glandular enlargement.
- (9) (a) Main causes of glandular enlargement

	Cause	Site	Signs
(A) Acute lymphadenitis		Local	Acute sepsis in catchment area
(B) Chronic lymphadenitis		Local	Chronic sepsis in catchment area
(C) T B. glands	(a) Local or (b) General		Periadenitis, caseation Lymphoid type
(D) Syphilis	(a) Local ↓ (b) General		Primary chancre Secondary syphilitic signs. No periadenitis and caseation
(E) Malignant		Local	Hardness and infiltration Primary growth in catchment area
(F) Hodgkin	(a) Local ↓ (b) Neighbouring ↓ (c) General		No periadenitis, no caseation Enlarged liver and spleen
(G) Lympho-sarcoma	(a) Local ↓ (b) Regional		Rapid irregular infiltration and growth
(H) Lymphatic leukaemia		General	Lymphocytosis

## (b) Causes of local growth

- (1) Acute or chronic septic
- (2) Tuberculosis early
- (3) Primary chancre
- (4) Malignancy

## Causes of general growth

- (1) Tuberculosis generalized type
- (2) Secondary syphilis
- (3) Hodgkin later stage
- (4) Leukæmia

## (c) Causes of enlargement of special groups

Group	Causes
(1) Occipital	Septic focus in catchment area
(2) Preauricular	Sepsis, epithelioma, rodent ulcer lupus, chancre
(3) Submental	Sepsis, chancre, carcinoma of the tip of the tongue
(4) Submaxillary	Sepsis } Carcinoma } in oral cavity
(5) Superior cerv	(a) Sepsis facial oral, pharyngeal (b) Tuberculosis (c) Secondary carcinoma (d) Syphilis (e) Hodgkin (f) Lympho-sarcoma
(6) Post-cervicals	(a) Sepsis (b) Syphilis
(7) Supra clavicular	(a) Tuberculosis lung apex, axillary (b) Carcinoma breast, abdo- minal tratis
(8) Axillary	(a) Sepsis breast, superior extremity (b) Tuberculosis (c) Secondary carcinoma breast (d) Hodgkin
(9) Epitrochlear	(a) Syphilis (b) Sepsis
(10) Pentoneal	(a) Tuberculosis (b) Carcinomatous (c) Hodgkin
(11) Iliac	(a) Sepsis from foot (b) Tuberculosis

- |      |           |   |        |                                      |
|------|-----------|---|--------|--------------------------------------|
| (12) | Inguinal  | } | (a)    | Sepsis genital inferior              |
|      | +         |   |        | extremity                            |
|      | Femoral   |   | (b)    | Venereal syphilis, softsore,<br>etc. |
|      |           |   | (c)    | Secondary Carcinoma or<br>melanoma   |
| (13) | Popliteal |   | Sepsis |                                      |

(10) Glandular fever

- (a) Mononucleosis is characteristic of glandular fever
- (b) There are two types of glandular fever
- (1) Juvenile adenitis > fever
- (2) Adult fever > adenitis

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# CHAPTER VII

## THE BONES

### I. ANATOMY

#### (A) PARTS

- (1) Diaphysis:
  - (a) Cortex
    - (α) Haversian canals
    - (β) Lacunae
    - (γ) Canaliculi
  - (β) Cancellous
  - (c) Marrow
- (2) Metaphysis: Diaphyseal side of epiphyseal cartilage
- (3) Epiphyseal cartilage
- (4) Epiphysis
- (5) Articular cartilage
- (6) Periosteum
  - (a) Fibrous: outer layer
  - (β) Episteum: germinal layer

#### (B) BLOOD-SUPPLY

- (1) Nutrient system: Marrow
- (2) Periosteal system: Cortex and periosteum
- (3) Metaphyseal system
  - (a) Metaphysis
  - (β) Epiphysis
  - (c) Synovial membrane

#### (C) DEVELOPMENT

- (1) Epiphyseal
  - (a) Zone of cartilage proliferation
  - (β) Zone of provisional calcification
  - (c) Zone of ossification
- (2) Periosteal: From the episteum
- (3) Membranous: Skull bones

#### (D) METABOLISM

Calcium content of the bone is a chemical equilibrium between

- (a) Crystalline calcium phosphate of bone

+ (β) Ionised and non-ionised calcium phosphate in blood

Absorption, storage, and elimination of calcium are affected by

- (a) Vitamine D
- (β) Internal hormones, esp. parathormone



**(E) FORMATION**

- (1) **Requisites for bone formation are :**
  - (a) Ossifiable medium from undifferentiated connective tissue
  - (b) Local deposit of calcium
  - (c) Adequate blood-supply for assimilation of calcium
- (2) **Factors in the bone formation are**
  - (a) Formation osteoblasts produce precaceous tissue
  - (b) Resorption
    - (a) Osteoclasts
    - (b) Conversion of insoluble bone calcium into soluble blood calcium
- (3) **Role of circulation in bone formation :**
  - (a) Hypercalcaemia  $\rightarrow$  osteoporosis
  - (b) Anaemia  $\rightarrow$  osteosclerosis
  - (c) Absence or severance  $\rightarrow$  necrosis

**II. CONGENITAL AFFECTIONS OF THE BONES****(A) DISTURBANCES OF OSSIFICATION :****(1) ACHONDROPLASIA**

- Def** Intrauterine disturbance of endochondral ossification leading to
- Premature union of epiphyses of long bones and skull base**
- Eti** Incidence hereditary and familial
- Cause** abnormal internal secretion  
 $\downarrow$  abnormal bone-growth regulation
- Clinic** (1) Low stature  
 (2) Big vertex with small base  
 (3) Short extremities with spade hands  
 (4) Normal  
     (a) Trunk  
     (b) Intellect  
     (c) Sexual development

**(2) ANOSTEOPLASIA Cleido-cranial Dysostosis**

**Def** Imperfect ossification of membranous bones

- Clinic** (a) Ill formation of vertex skull with delayed closure of fontanelles  
 (b) Ill-formation of clavicles  
 (c) Delayed ossification of pubic bones

**(B) FRAGILITAS OSSIUM Osteogenesis imperfecta**

**Def** Undue fragility of bones leading to spontaneous and multiple fractures

- Varieties** (1) Foetal: Osteogenesis imperfecta congenita  
 (2) Infantile  
 (3) Fragilitas ossium tarda  
 (4) Osteosclerosis fragilis generalisata  
     (Syn.): Albers-Schonberg  
     Marble bones  
     Osteopetrosis

Path Fairbank's classification

- |                               |                  |                    |
|-------------------------------|------------------|--------------------|
| (1) Thick bone type           | congenital       | } Fragilitas Tarda |
| (2) Slender fragile bone type |                  |                    |
| (3) Honeycomb bone type       |                  |                    |
| (4) Marble bone type          | Albers-Schonberg |                    |

(1) OSTEOPENESIS IMPERFECTA CONGENITA: Fetal type

Etio: ? Parathyroid disturbance

Path Defective osteoblastic action

↓ Uddua bone fragility

Clinic Multiple idiopathic fractures at birth with

- (a) good union
- (b) deformities

(2) FRAGILITAS OSSIUM TARDA

Etio Hereditary and familial

Path Hypoplasia of mesenchyme. (mesoblast)

Clinic (1) Multiple fractures with good union Between the age of 3 and 17

- (2) Blue sclerae and early arcus senilis
- (3) Abnormal laxity of ligaments  
Tendency to sprains and dislocations
- (4) Generalized muscular atrophy
- (5) Osteosclerotic progressive deafness
- (6) Gross osseous deformities
- (7) Abnormal skull bulging temporals and occiput
- (8) X Rays Thin cortex + Honeycomb medulla

Treat (1) Local treat the fractures

prevent the fractures and sprains

(2) General calcium parathormone thyroxine

(3) OSTEOSCLEROSIS FRAGILIS GENERALIZATA

Albers-Schonberg disease

Syn Osteopetrosis Marble bones)

Def Irregular areas in the bones, of

- (a) Uniformly calcareous marblelike sclerosis
- + (b) Osteoporotic thinning and rarefaction

Etio Hereditary and familial

Any age

Path (1) Reduction of bone medullary cavity and marrow

(2) Pressure effects on cranial nerves

Clinic (1) Aplastic anaemia

(a) Anaemia

(b) Enlarged (a) liver (b) spleen, (c) lymph glands

(7) Hydrocephalus

(8) Cranial nerve palsies

(4) Idiopathic fractures

### III. TRAUMA

#### (I) PERIOSTEAL INJURIES

##### (A) PERIOSTEAL CONTUSION:

Sub-periosteal hæmatoma

Etiol	Direct injury
Clinic	Painful tender fixed swelling after injury
Sites	(1) Ribs, (2) Mandible, (3) Skull
Diff. diag	(1) Subcutaneous contusion or hæmatoma (2) Muscular contusion or hæmatoma (3) Bony affections trauma, inflammation, tumour
Compl	(1) Ossification node formation (2) Traumatic periostitis → sub-periosteal abscess (3) Periosteal adhesion → constant pain
Treat	(1) Rest and cold + pot. iodide ↓ (2) If inflammation → suppuration (a) Fomentations ↓ (b) Incision and evacuation

#### (II) FRACTURES

##### GENERAL CONSIDERATIONS

Def	Solution of continuity of a bone
Etiol	(1) Age (a) Toddling, (b) Senility (2) Sex (a) Males (b) Old females (3) Occupation laborious athletes (4) General health debility (5) Bone diseases

##### (A) General

- (1) Congenital and familial fragility
- (2) Disuse atrophy
- (3) Neuropathic diseases
- (4) Metabolic disturbances
  - (a) Osteomalacia
  - (b) Rickets
  - (c) Osteitis deformans
  - (d) Fibrocystic disease

##### (B) Local

- (1) Location exposure to trauma
- (2) Inflammation osteomyelitis
- (3) Atrophy
- (4) New growth
  - (a) Sarcoma → non union
  - (b) Carcinoma } → union
  - (c) Myeloma }
  - (d) Hypernephroma
  - (e) Cysts
- (5) Erosions aneurysm

- Causes**
- (1) **Traumatic**
    - (a) Direct
    - (b) Indirect
    - (c) Muscular violence
  - (2) **Spontaneous Idiopathic**  
due to general diseases with bones normal
  - (3) **Pathological**  
due to bone abnormality

## VARIETIES OF FRACTURES

### (1) IN RELATION TO EXTERNAL WOUND

- (A) **Closed Simple**
- (B) **Open Compound**
  - (a) Direct open
  - (b) Indirect open through air sinuses  
fragments piercing the skin  
from within

### (2) IN RELATION TO ETIOLOGY

#### (1) TRAUMATIC FRACTURES

##### (A) BIRTH FRACTURES:

##### (1) INJURIES

- (a) **Shaft of the humerus**

Etio Breech presentation  
Clinic Dangling arm  
Treat Arm strapped to the chest over a pad  
of cotton wool in moderate abduction
- (b) **Shaft of the clavicle**

Etio After-coming head  
Clinic Callus lump  
Treat Sling for two weeks
- (c) **Shaft of the femur:**

Etio Breech presentation  
Caesarean section  
Treat Gallows splint with vertical suspension  
for four weeks
- (d) **Depressed fracture skull**

Etio Slightly contracted pelvis  
Clinic Parietal hæmatoma,  
Depression or furrow  
Treat (1) Conservative  
(2) Elevation

## (c) Epiphysial displacements

## (a) Lower femoral :

- Treat (1) Traction with knee flexed  
(2) Vertical suspension

## (β) Lower humeral

Clinic Swollen unmobile elbow

Treat Traction

↓ Sling with elbow at right angles.

## (2) CONGENITAL FRAGILITY OF BONES

*Osteogenesis imperfecta congenita.*

## (3) CONGENITAL PSEUDARTHROSIS OF TIBIA

Etio Unknown

Path Fracture with persistent non union

Site Junction of middle and lower third

Compl Talipes equinus

- Treat (1) Calliper splint  
↓ Bone graft (after puberty)  
(2) Fibular graft.

## (B) TRAUMATIC FRACTURES

## (II) PATHOLOGICAL FRACTURES (Diseases of the bones)

## (A) BONE ATROPHY, OSTEOPOROSIS, DECALCIFICATION

- (1) Disuse bone atrophy
- (2) Poliomyelitis
- (3) Senile osteoporosis
- (4) Hyperæmic decalcification
- (5) Infective decalcification (osteomyelitis)
- (6) Rickets
- (7) Osteomalacia
- (8) Coeliac disease, steatorrhea and sprue
- (9) Idiopathic juvenile osteoporosis

## (B) BONE TUMOURS AND CYSTS :

## (1) Bone cysts and osteitis fibrosa

- (a) Solitary bone cyst
- (b) Variants of bone cyst
- (c) Hyperparathyroid osteitis fibrosa
- (d) Pagets disease osteitis deformans

## (2) Bone Tumours

## (a) Benign

- (a) Chondroma & chondromyxoma
- (β) Giant celled tumours
- (γ) Angioma.

**(b) Malignant****(1) Primary**

- (a) Osteolytic sarcoma
- (β) Ewing's sarcoma
- (γ) Multiple myeloma

**(2) Secondary****(a) Carcinoma**

Breast  
Prostate  
Thyroid  
Kidney  
Bronchus

**(β) Hæmopoietic**

- (i) Hodgkin
- (ii) Chloroma
- (iii) Hand-Schüller
- (iv) Gaucher

**(c) CONGENITAL FRAGILITY OF BONES****(a) Osteogenesis imperfecta**

- (a) Fœtal
- (b) Infantile
- (c) Adolescent

**(β) Osteosclerosis fragilis**

Albers-Schönberg

**(III) SPONTANEOUS FRACTURES** General diseases with normal bones

Factors : muscle inco-ordination  
fatigue  
loss of sensations

- (1) Tabes dorsalis
- (2) Syringomyelia
- (3) Epilepsy
- (4) March fracture with metatarsus-atavicus

**(3) IN RELATION TO CAUSATIVE VIOLENCE**

- (1) Traction separation of processes
- (2) Compression vertebrae, os calcis
- (3) Flexion
- (4) Torsion

**(4) IN RELATION TO THE EXTENT AND NATURE**

- (1) Complete
- (2) Incomplete
- (3) Separation of epiphysis

**(5) IN RELATION TO THE SHAPE OF BROKEN ENDS**

- (A) **Complete**
- (a) Transverse
  - (b) Oblique
  - (c) Spiral
  - (d) Butterfly
  - (e) Comminuted
- (B) **Incomplete**
- (a) Sub-periosteal crack
  - (b) Green stick
  - (c) Fissured
  - (d) Depressed
  - (e) Pond-shaped
  - (f) Star shaped

**(6) IN RELATION TO POSITION OF BROKEN ENDS**

- (A) Impacted
- (B) Non impacted
- (C) Separated
- (D) Interposed

**(7) IN RELATION TO TRAUMA TO OTHER STRUCTURES**

- Complicated**
- (a) Trauma to nerves, vessels, joints, viscera
  - (b) General complications

*Clinical features of fractures*

- (1) **History of Injury**
  - (a) Grave
  - (b) Ordinary
  - (c) Negligible
- (2) **General condition**
  - (a) Shock
  - ↓ (b) Febrile reaction
- (3) **Pain**
  - (a) Local
  - (b) Referred
- (4) **Loss of function** Due to
  - (a) Pain
  - (b) Spasm
  - (c) Deformity
  - (d) Paralysis
- (5) **Superficial signs of injury :**
  - (a) Present in direct fractures
  - (b) Absent in indirect fractures

**(6) Deformity** n)

- Types (A) Altered length (a) Shortening  
 (b) Lengthening  
 (B) Angulation  
 (C) Rotation  
 (D) Lateral displacement

**Accessory factors**

- (A) Oedema or haematoma  
 (B) Distension of joints  
 (C) Spasm of muscles

**Clinic (a) Inspection**

- (a) Angulation  
 (b) Torsion  
 (r) Broadening

**(b) Palpation**

Relative positions of bony points

**(c) Mensuration**

From and to fixed points on affected and sound sides.

- Causes** (1) Initial violence  
 (2) Contraction of muscles  
 (3) Gravity  
 (4) Extravasations  
 (5) Manipulations

**(7) Crepitus** Felt or/and heard

- Present in** (a) Fractures  
 (b) Osteoarthritis  
 (c) Tenosynovitis  
 (d) Surgical emphysema

**Absent in** following fractures

- (a) Incomplete  
 (b) Impacted  
 (u) Separated  
 (d) Interposed

Soft in separation of epiphysis

**(8) Abnormal mobility** (should not be elicited)

- (a) Abnormal mobility in the course of a bone  
 (b) Failure of the end to move when shaft is moved

**(9) X Rays****(1) Planes**

- (a) Anteroposterior  
 (b) Lateral  
 (c) Oblique  
 (d) Stereoscopic



- (4) **Time** Till union is sound  
     Upper limb 4-6 weeks  
     Lower limb 8-12 weeks
- (5) **Removal**  
     (a) Be extremely gentle and cautious  
     (b) Removal of half  
         ↓ Removal of the bed
- (6) **After-treatment of removal**  
     Elastoplast support  
     Massage and movements  
     Physiotherapy
- (7) **Complications of plaster**  
     (See above)

## (B) CONTINUOUS TRACTION WITH COUNTERTRACTION AND PLASTER:

- Ind (1) Deep fractures  
     (2) Difficult manipulative reduction  
     (3) Difficult fixation after reduction  
     (4) Lower extremity fractures
- (1) **Fixed or passive traction** By splints or plasters
- | <i>Apparatus</i>               | <i>Point de appui</i>     |
|--------------------------------|---------------------------|
| (1) Thomas splint              | Tuber ischii same side    |
| (2) Abduction frame            | Groin strap opposite side |
| (3) Well leg traction          | } Opposite sole           |
| (4) Roger Anderson             |                           |
| (5) Plasters                   |                           |
| (a) Whitman                    |                           |
| (b) Incorporated traction pins |                           |
- (2) **Mobile or active traction** By Pulley and Weights

### (A) Indirect

- (a) Adhesive strapping method  
 (b) Vertical suspension method  
 (c) Splint traction method  
     (a) Braun  
     (b) Hodgen  
     (c) Suspended splint

### (B) Direct or skeletal

- (a) Traction pins  
 (b) Traction wires  
 (c) Traction callipers  
 (d) Traction tongs

## (3) Combined, fixed and mobile traction :

Thomas splint with weight traction

Raising the foot of the bed

**(C) OPERATIVE REDUCTION, FIXATION AND PLASTER**

- Ind (1) Difficult or failed reduction by conservatism  
 (2) Difficult retention of reduced fracture  
 (3) Persistent great displacement inspite of efficient traction  
 (4) Non union  
 (5) Special features  
     (a) Interposition of soft parts  
     (b) Avulsion of processes  
     (c) Fear of cross-union  
     (d) Where perfect alinement is necessary

- Operation (1) Simple impaction and soft tissue suture  
 (2) Suturing  
     (a) Absorbable sutures  
     (b) Non-absorbable sutures  
     (c) Metal sutures  
     (d) Fascial sutures

Ind Olecranon, patella

(3) Excision Patella, head of radius

(4) Plates and screws

Ind Transverse fracture shaft of femur

(5) Wires and bands

Ind Oblique or spiral fractures of long bones

(6) Bone grafting

- Ind (1) Transverse fractures of shafts  
 (2) Fractures of processes  
 (3) Non-union

Sources (1) Auto (2) Homo (3) Hetero

- Tech (1) Intramedullary  
 (2) Inlay surface

- Varieties (1) Massive cortical  
 (2) Bone chips  
 (3) Bone marrow

(7) Nailing

Ind Bone processes  
Neck of the femur

Varieties Ivory bone, metal pins

(8) **Intramedullary pegs**

Ind Transverse fractures of shafts

Varieties Ivory bone.

*Methods of Fixation of reduced fracture*

- (1) **First aid** Improvised splint
- (2) **Sand-bags** Fracture femoral neck in very old
- (3) **Bandages** Jaw
- (4) **Strapping** Ribs clavicle
- (5) **Binders** Crack fractures of pelvis
- (6) **Splints**
- (7) **Plasters**
- (8) **Traction** Mobile (a) indirect, (b) direct
- (9) **Operative fixation**

**(III) RESTORATION OF FUNCTION**

- (1) **Massage** On the day following reduction
- (2) **Active movements**
  - (a) Of non included joints : immediate after reduction
  - (b) Of included joints : immediate after removal of plaster
- (3) **Passive movements** Gradual short of pain
- (4) **Weight bearing on appliances** Callipers & boots  
After firm union
- (5) **Weight bearing on the fractured bone**  
After ossification of the union
- (6) **Physiotherapy**
  - (a) Non included parts : immediate
  - (b) Included parts : immediate after removal of plaster

**OPEN AND INFECTED FRACTURES**

- Etio. varieties**
- (1) **External** Outside violence penetrating upto and fracturing the bone
  - (2) **Internal** Fractured ends piercing the skin from inside

- Classification**
- (1) Indirect communication : air sinus, pharynx
  - (2) Puncture secondary to fracture
  - (3) Laceration of soft tissues upto fracture
  - (4) Laceration of soft tissues  
+ Comminuted fracture
  - (5) Gunshot wounds + fracture

- Complications:**
- (1) **Pyococcal infection** Acute and chronic
  - (2) **Anaerobic infection** Tetanus and gas gangrene
  - (3) **General infection** : Septicæmia, pyæmia
  - (4) **Abnormal union** : Non and mal union

## Treatment

**(A) OPEN FRACTURES WITHIN 24 HOURS:**

- (1) First aid
  - (a) Temporary immobilization in deformed position
  - (b) Iodine dressings
  - (c) Treat hemorrhage and shock
  - (d) Anti-tetanus and anti-gas gangrene serum
  - (e) Chemo-therapy
- (2) Radiography
- (3) Debridement
  - (a) Removal of every non viable particle
  - (b) Removal of completely isolated bone fragments
  - (c) Removal of foreign bodies and dirt
  - (d) No irrigation no antiseptics
- (4) Sutures
  - (a) Suture only severed important tissues
  - (b) No deep approximation
  - (c) Avoid catgut ligatures
- (5) Manipulative reduction
  - Methods (a) Open Before suture of tendons and nerves
  - (b) Closed After skin sutures
- (6) Plaster with window or pin extension with splint

**(B) OPEN FRACTURE AFTER 24 HOURS**

- Varieties
- (1) Fractures seen after 24 hours
  - (2) Potentially infected fractures seen at any time grossly soiled
  - (3) Obviously infected fractures
  - (4) Failure of primary excision and debridement
- Technics
- (A) Splint and traction pin method
- Ind
- (1) Fractures seen after 24 hours
  - (2) Potential infection
- Tech
- (1) Anaesthesia not local
  - (2) Preparation of the limb
  - (3) Insertion of Steinmann pin
  - (4) Debridement
  - (5) Antiseptic wash
  - (6) Flavine and paraffin pack
  - (7) Splint and weight traction
- (B) Winnet orr
- Ind
- (1) Failure of primary debridement
  - (2) Infected fractures
- Tech
- (1) Anaesthesia not local
  - (2) Preparation of the limb
  - (3) Complete saucerization

- (4) Vaseline pack
- (5) Complete plaster
- (6) Traction skeletal (if necessary)

*Fracture                      Site of pin*

- (a) Femur                      Tibial tubercle
- (b) Upper tibia              1.5 inches above ankle
- (c) Lower tibia              On calcus

- After treat (1) Removal at the end of five weeks of
- (a) Plaster
  - (b) Sequestra
  - (c) Traction pin
- (2) Two-monthly changes of plaster till fracture is united

- Post-compl. (1) Imperfect drainage fever
- (2) Plaster complications
  - (3) Pin complications
  - (4) Secondary hæmorrhage
  - (5) Sinus formation

### (C) Amputation

- (1) **Primary** Prophylactic (should be rare)

- Ind (a) Limbs Crushed out of recognition
- (b) Limbs Very grossly lacerated + Grossly manure soiled
- (c) Limbs Badly crushed in
- (a) Old people
  - (b) Debilitated people
  - (r) Diseased people

- (2) **Delayed**: As soon as indications are evident

- Ind (1) Established gangrene
- (2) Anaerobic gangrene
- (3) Creeping up infection: inspite of local and general treatment
- (4) Generalized infection inspite of local and general treatment

- (3) **Secondary**: Not too late just as not too early

- Ind Chronic persistent infection with patient gradually going down

- |      |     |           |   |
|------|-----|-----------|---|
| Tech | (1) | Primary   | Amputation of choice  |
|      | (2) | Delayed   | Guillotine amputation at the lowest level of safety and without closure |
|      | (3) | Secondary | Amputation at the highest level of safety with closure but drainage     |

*Complications of delayed or inefficient treatment of open fractures*

- |              |     |  |
|--------------|-----|--|
| (A) Local    | (1) | Suppuration                                  |
|              | (2) | Necrosis with sequestration                  |
|              | (3) | Non union                                    |
| (B) Regional | (1) | Infection and adhesions of tendons & muscles |
|              | (2) | Infection and ankylosis of joints            |
| (C) General  |     | Septicæmia, pyæmia                           |
| (D) Special  | (1) | Tetanus                                      |
|              | (2) | Gas gangrene.                                |

## INDIVIDUAL FRACTURES

### (1) MAXILLA

- |        |     |   |
|--------|-----|---|
| Etio   | (1) | Direct trauma                             |
|        | (2) | Tooth extraction                          |
| Sites  | (1) | Antral wall                               |
|        | (2) | Alveolus                                  |
| Path   |     | Compound                                  |
| Clinic | (1) | Deformity                                 |
|        | (2) | Painful bite                              |
| Comp   | (1) | Subcutaneous hæmatoma                     |
|        | (2) | Surgical emphysema                        |
|        | (3) | Osteitis with necrosis                    |
|        | (4) | Antritis (sinusitis)                      |
|        | (5) | Aspiration pneumonia                      |
|        | (6) | Deformity                                 |
| Treat  | (1) | Lead lotion                               |
|        | (2) | Mouth and nasal irrigations               |
|        | (3) | Reduction (a) Closed bimanual (b) Open    |
|        | (4) | Fixation (a) Face strap (b) Dental splint |

### (2) ZYGOMA :

- |      |                            |          |
|------|----------------------------|----------|
| Etio | Direct trauma              | football |
| Path | Arch displaced down and in |          |

Clinic	(1) Deformity
	(2) Lockjaw
	(3) Infraorbital anesthesia
Compl	(1) Deformity
	(2) Injury to infraorbital nerves
Treat	Reduction
	(a) Digital bimanual
	(b) Hook
	(c) Open leverage

**(3) NASAL**

Etio	Direct trauma	(1) Lateral impaction
		(2) Vertical impaction
Path	Depression or lateral deviation	
Clinic	(1) Hemorrhage	
	(2) Deformity with swelling	
	(3) Surgical emphysema	
Compl	(1) Deformity depressed bridge	
	(2) Sepsis	
Treat	(1) Reduction by rubber covered sinus forceps	
	(2) Fixation by antiseptic pack	
After treat	Nasal irrigations	

**(4) MANDIBLE****(A) CANINE FOSSA:**

Etio	Direct blows on chin	
Path	(1) Compound into oral cavity	
	(2) Displacement down and back	
Clinic	(1) Painful bite	
	(2) Bloodstained saliva	
	(3) Irregular line of teeth	
	(4) Associated contusion of lip & soft parts	
Compl	(1) Sepsis with necrosis	
	(2) Delayed union mal union	
	(3) Submaxillary cellulitis	
	(4) Aspiration pneumonia	
Treat	(1) Reduction by manipulations	
	(2) Fixation by (a) Four tailed bandage	
		(b) Dental plate
	for three weeks	
After treat	(1) Tubal liquid foods	
	(2) Gargles for three weeks	

**(B) ANGLE:**

Etio	Direct trauma	
Clinic	(1) Painful bite	
	(2) Bloodstained saliva	
	(3) Altered line of teeth	
	(4) Local tenderness with crepitus	

Compl	As in (A)
Treat	(1) Reduction by manipulations (2) Fixation by Four tailed bandage for Three weeks
After treat	(1) Tubal liquid feeds (2) Gargles

**(C) CORONOID PROCESS:**

Etio	Blows on open chin
Path	Displacement (a) nil or (b) upwards
Clinic	(1) Painful bite (2) Absence of temporal contractions
Treat	(1) Four tailed bandage for three weeks (2) Wiring
After treat	(1) Tubal liquid feeds (2) Oral antisepsis

**(D) CONDYLE:**

Etio	(1) Direct trauma (2) Blows on chin
Clinic	(1) Painful movements (2) Crepitus (3) Effusion into temporomandibular joint
Compl	Ankylosis of temporomandibular joint
Treat	(1) Four-tailed bandage } three weeks + (2) Oral antisepsis } (3) Excision of the condyle

*Immobilization apparatus for fracture mandible*

- (A) Bandages and straps
  - (a) Four tailed bandage
  - (b) Barrel bandage
  - (c) Hamilton strap
  - (d) Fry's elastic support
- (B) Orthopaedic splints
- (C) Wiring of teeth

**(5) CLAVICLE****(A) ACROMIAL END:****(1) Acromial tip**

Etio	Direct trauma
Path	Displacement downwards
Clinic	(1) Local signs of trauma (2) Painful abduction (3) X Rays
Treat	(1) Strapping and sling for 3 weeks (2) Wiring



- After-treat (1) Shoulder exercises after three weeks  
 (2) Between trapezoid and conoid ligaments  
 Etio Direct trauma  
 Path No displacement  
 Clinic (1) Local signs of trauma  
 (2) X Rays  
 Treat Strapping and sling for three weeks  
 After-treat Shoulder exercises after three weeks

### (B) STERNAL END:

- Etio Direct trauma  
 Path No displacement  
 Clinic Local signs of trauma  
 Treat Axillary pad and sling for three weeks

### (C) SHAFT: Junction of curves

- Etio (1) Predisposers anatomical weakness due to  
 (a) Junction of curves  
 (b) Change in contour  
 (c) Groove for subclavius  
 (d) Nutrient foramen  
 (2) Exciting falls on hand  
 Path (1) Complete or incomplete  
 (2) Displacement  
 Outer fragment down + in + forwards  
 Clinic (1) Decubitus  
 (a) Adducted arm with supported elbow  
 (b) Deviated neck to the same side  
 (2) Inability to abduct the arm  
 (3) Local signs of fracture  
 Compl (1) Mal-union Sclerosis  
 (2) Pressure syndrome (1) Nerves, (2) Vessels  
 (3) Treatment complication pressure on axilla  
 Treat (1) Sayre's strapping  
 (2) Three handkerchieves and a sling  
 (3) Cross splint and a sling  
 (4) Figure of eight bandage and a sling  
 (5) Recumbency with central pillow  
 (6) Plaster cast  
 (7) Open operation  
 After treat (1) Fixation  
 by (a) Sling  
 (b) Bandage  
 (c) Strapping  
 (d) Splint  
 (e) Plaster  
 for Three weeks  
 over An axillary pad

- in (a) Elbow flexed, forward and up  
 (b) Forearm pronated  
 (c) Hand on opposite shoulder

## (2) Exercises

- (a) Immediate fingers, wrist elbow  
 (b) Delayed shoulder

## (6) SCAPULA

## (A) HEAD AND NECK:

## (1) Glenoid cavity

- Etiology Blows on shoulder  
 Path Crack fracture with no displacement  
 Clinic Synovial effusion in shoulder  
 Compl Ankylosis shoulder

## (2) Anatomical neck

- Etiology As in (1)  
 Path Displacement downwards  
 Clinic (1) Flattened shoulder with effusion  
 (2) Unduly prominent acromion  
 (3) Lengthened arm  
 (4) Crapitus

Diff. diag Dislocation shoulder

Compl As in (1)

- Treat (1) Support  
 by (a) Sling  
 (b) Abduction frame  
 for Two weeks  
 (2) Traction  
 by Abduction frame  
 for Four weeks  
 (3) Exercises and physiotherapy  
 (a) Immediate fingers, wrist, elbow  
 (b) After 10 days shoulder

## (3) Surgical neck

- Etiology As in (1)  
 Path As in (2) + Coracoid process involved in displacement  
 Clinic As in (2)

## (4) Acromion

- Etiology As in (1)  
 Path Slight displacement  
 Clinic (1) Local signs of fracture  
 (2) Painful deltoid action

## (5) Coracoid process

- Etiology (1) Back fire of gun

## (2) Acromio-clavicular anterior dislocation of shoulder

Path Slight displacement  
 Clinic Local signs of fracture

## (B) BODY of the scapula

Etio Direct trauma  
 Path Displacement slight or nil  
 Clinic Local signs of injury and fracture  
 Compl (1) Fracture underlying ribs  
 (2) Hematoma  
 Compl Of fracture scapula  
 (1) Ankylosis shoulder  
 (2) Osteoarthritis shoulder

*Treatment of fracture scapula*

- (1) Reduction By manipulations
- (2) Fixation
  - In (a) Arm by the side of the chest
  - or (b) Shoulder abduction
  - by (a) Sling
  - (b) Bandage
  - (c) Abduction splint
  - over An axillary pad
  - for Three to four weeks
- (3) Exercises and physiotherapy
  - (a) Immediate fingers, wrist elbow
  - (b) Delayed shoulder

## (7) HUMERUS

## (A) UPPER END AND NECK :

## Sites

- (1) Anatomical neck
 

Etio Direct trauma  
 Path Displacement  
 (a) Impaction  
 (b) Upper fragment downwards or forwards
- Clinic Articular effusion
- (2) Surgical neck
 

Etio (1) Direct trauma  
 (2) Dislocation shoulder
- Path Displacement  
 (a) Upper abducted  
 (b) Lower up and adducted
- Clinic (1) Round swollen shoulder  
 (2) Abrupt hollow below the shoulder  
 (3) Arm abducted and shortened  
 (4) Head not moving with the shaft  
 (5) Crepitus

- (3) **Separation of epiphysis**  
 Etio Age between 6 and 20  
 Clinic (1) Age  
 (2) Soft crepitus  
 (3) Difficult reduction.
- (4) **Tuberosities**  
 (A) External  
 (B) Internal
- Etio (1) Dislocation shoulder } avulsion fracture  
 (2) Muscle action }  
 (3) Direct trauma contusion fracture
- Path Displacement in the direction of attached muscles
- Clinic (1) Palpation in abnormal position  
 (2) Attached muscles out of action  
 (3) Crepitus (a) Present in contusion fractures  
 (b) Absent in avulsion fractures
- Treat (A) Fractures without displacement (contusion)  
 (1) Sling for two weeks  
 (2) Active exercises immediate  
 (B) Fractures with displacement (avulsion)  
 (1) Reduction by manipulations  
 (2) Fixation For external tuberosity  
 By (a) Plaster of Paris  
 (b) Abduction frame  
 In Abduction 90  
 Everson 60°  
 For Eight weeks  
 (3) Active exercises  
 Distal joints immediate  
 Shoulder eight weeks.

*Etiological varieties of fracture neck*

(1) **DIRECT CONTUSION CRACK FRACTURES**

Etio Direct trauma

Treat No immobilisation

Sling and early exercises

(2) **ADDUCTION FRACTURES (anatomical neck).**

Etio Fall on outstretched arm

Children

Site Anatomical neck (See above)

Clinic (1) Shaft adducted and impacted

(2) Articular effusion

Comp Adhesions

Treat (A) Elderly Immediate exercises and sling

(B) Young

(1) Reduction By traction + abduction

↓ (2) Fixation:

By Abduction frame

In: Abduction arm

For: Four weeks.

## (III) Physiotherapy and movements

- (A) Immediate fingers, wrist elbow
- (B) Delayed shoulder
- (C) Deltoid massage

## (B) SHAFT OF THE HUMERUS:

Eti	Direct indirect, muscular trauma
Varieties	(1) Transverse (a) Direct trauma (b) Angular strain
	(2) Oblique angular strain
	(3) Spiral rotational strain
Sites	(1) Subcervical Above the pectoral insertion
Path	Upper fragment abducted Lower fragment adducted
	(2) Upper third Above the deltoid insertion
Path	Upper fragment adducted Lower fragment abducted and up
	(3) Middle third Musculo-spiral groove
	Path Upper fragment abducted Lower fragment adducted and up.
	(4) Lower third
	Path Upper fragment anterior and down Lower fragment posterior and up.
Clinic	(1) History of trauma and loss of function
	(2) Shortened arm
	(3) Local broadening
	(a) Lateral
	(b) Antero-posterior
	(4) Angulation
	(5) Abnormal mobility
	(6) Crepius
Compl	(1) Injury to the musculo-spiral nerve
	(2) Non-union
	(3) Myositis ossificans

*Treatment of fracture shaft of the humerus*

## (I) General Principles

## (1) Reduction:

by (a) Manipulations

- (b) Traction (a) Splints
- (b) Olecranon pin

## (c) Operation

- Ind (a) Radial injury
- (b) Soft tissue intervention
- (c) Failed traction

## (II) Fixation

- in (a) Arm: adducted
- Elbow flexed
- Forearm: supinated

(b) **Arm: abducted and flexed**

Elbow flexed

Forearm supinated

by (1) **Adduction apparatus**

(a) Robert Jones splint

(b) Crutch Y splint

(c) Plaster of Paris

(2) **Abduction apparatus**

(a) Bohler abduction splint

(b) Aeroplane splint

(c) Thomas arm splint

With Traction or no traction

For Three weeks

(III) **Physiotherapy and movements**

(2) *Special fractures*

(A) **Spiral fractures**

(1) **Fixation**

By plaster slab + sling

Extent axilla → elbow → shoulder

For Five weeks

(2) **Physiotherapy and active exercises**

(a) Immediate fingers and wrist

(b) After five weeks elbow and shoulder

(B) **Horizontal fracture**

(1) **Fixation**

By (a) Plaster slab

(b) Abduction frame

In abduction  $60^{\circ}$  + forward flexion  $40^{\circ}$

For six to eight weeks

(C) **Delayed union fractures**

(1) **Fixation**

By Plaster spica

Extent Shoulder and elbow included

For Five to six months (X Ray evidence of union)

(2) **Finger exercises**

(D) **Non-union fractures**

Bone graft operation

(E) **Radial nerve palsy**

(1) **Fixation**

By Plaster slab

In Wrist: dorsiflexed

Metacarpo-phalanges extended

(2) **Exploration and neurolysis**

Ind No signs of recovery at the end of

**(C) LOWER END OF THE HUMERUS :****(1) SUPRACONDYLAR TRANVERSE****Etio** Falls on hand

**Path** (A) **Common type** Displacement  
 Upper fragment forwards and down  
 Lower fragment backwards and up  
 Fracture oblique from behind forwards and down

(B) **Reverse type** Reverse is the displacement and fracture line

**Clinic** (1) Normal bony points of the elbow joint  
 (2) Shortened arm acromion to external condyle  
 (3) Swelling above the elbow with anteroposterior broadening  
 (4) Crepitus

**Compl** (1) Limitation of flexion and extension  
 (2) Cubitus valgus or varus

**Treat** (1) **Reduction** By manipulations (of the common type)

- (a) Traction
- (b) Local pressure
- (c) Flexion of the elbow

**(2) Fixation**

In Elbow flexed 45°

Forearm supine

Hand placed on opposite shoulder

By Posterior plaster slab and collar cuff

For Three weeks

**N B.**—In the other variety the fracture is reduced by traction extension of the elbow and is immobilised in extension.

**After treat** (1) **Exercises**

- (a) Immediate fingers and shoulder
- (b) After three weeks: elbow

**(2) Check X Ray film : After one week****(2) TRANS-CONDYLAR OR DICONDYLAR**

**Site** At the level of epicondyles  
 Involving olecranon fossa

**Compl** Limitation of movements**Treat** Manipulative reduction**(3) T OR Y FRACTURE****Etio** Direct injury in adults**Treat** (A) **Reduction** by manipulations**(1) Manipulations**

- (a) Traction on fully extended elbow
- ↓ (b) Local lateral manipulations

(2) **Fixation**

In : elbow extension

By plaster of Paris

For four weeks

(B) **Skeletal pin traction**

Through olecranon

With elbow flexed to right angle

(C) **Excision arthroplasty**

Ind (a) Patient over 40

(b) Much comminution

(c) Failure of other methods

Tech (1) Operation excision + arthroplasty

↓ (2) Fixation

In elbow flexed

By plaster slab + collar cuff

For four weeks

Sequela (a) Ankylosis

(b) Deformity

(4) **EXTERNAL CONDYLE**

Eti Age between 5 and 15

Path (1) Extent

(a) External condyle

(b) External condyle + capitellum

(c) Condyle + capitellum + part of trochlea

(d) Part of metaphysis with extensor origin

(2) Displacement

(a) Lateral

(b) Rotational

Clinic (1) Articular effusion with free movements

(2) No crepitus

(3) Disturbed bony point relations

Diff. diag Sprain of the elbow

Compl (1) Non-union

(2) Ankylosis elbow

(3) Cubitus valgus

(4) Tardy ulnar palsy

Treat (1) Manipulative reduction

(A) Manipulations

(a) Gradual elbow flexion

(b) Lateral compression

(B) Fixation

In elbow flexion

By plaster slab with collar cuff

For three weeks

(2) Operative reduction

Ind Failure of manipulations



- Tech (1) Exposure lateral curved incision  
 ↓ (2) Open reduction  
 v (3) Fixation by suture or pinning

# (5) INTERNAL CONDYLE

- (A) Extra capsular  
 (B) Intra capsular

# (6) SEPARATION OF LOWER HUMERAL EPIPHYSIS

Etio Age upto 18

Causes Falls on elbow  
 Dislocation elbow

Path Joint involvement

- Clinic (1) History of injury  
 (2) Effusion into the joint  
 (3) Abnormal bony point relations

## Varieties

### (A) Metaphysis

- Clinic (1) Signs of synovitis  
 (2) X-Rays (a) Lateral view of affected joint  
 (b) Lateral view of normal joint

Treat (1) Manipulative reduction

- ↓ (2) Fixation  
 In full extension  
 By plaster slab  
 For three weeks

(B) External condyle (See above)

### (C) Epicondyles

(1) External

(2) Internal

Etio Valgus strain

- ↓ Traction of common flexor origin  
 Age between 7 and 17

Path Displacement degrees

- (a) Minimal simple displacement  
 (b) Marked simple displacement  
 + rupture int. lateral ligament  
 (c) Avulsion  
 + Rupture ligament  
 + Interposing displacement  
 (d) Avulsion  
 + Outward dislocation.

Clinic X-Ray absence of ossification centre

Compd Tardy ulnar paralysis

Treat (A) Simple

- (a) Rest in flexion by collar cuff

.. ↓ (b) Active exercises

## (B) Interposing epicondyle

## (1) Manipulative reduction:

Supination and extension

↓ Flexion just above rt. angle

↓ Fixation by collar cuff.

## (2) Operative reduction:

Tech (a) Reduction

↓ (b) Catgut fixation

↓ (c) Anterior ulnar transposition

## (D) Capitellum Alone or in association with external condyle.

(See above &amp; below)

## (E) Trochlea

## (7) CAPITELLUM

## Varieties (A) Bruising of capitellar articular cartilage

Etio Fracture radial head

Clinic Limited extension with joint effusion

Compl (1) Avascular necrosis

(2) Osteochondritis dissecans.

## (B) Chip fracture of articular cartilage

Etio Fracture radial head

Clinic (1) Limited extension with joint effusion

(2) X-Ray negative

Treat Excision

## (C) Fracture front half of the capitellum

Etio Fracture radial head

Clinic (1) Limited extension with joint effusion

(2) X Ray lateral view

Treat (1) Manipulative Reduction

(a) Manipulations

extension

+ traction

+ direct pressure

(b) Immobilization

In Acute flexion

or extension

By Plaster slab

For Four weeks

(2) Operative reduction

Ind Failed manipulations

(3) Excision

Ind Old unreduced fracture

*Complications of fracture lower end of humerus*

## (1) NERVES: Ulnar Median Radial

(a) Immediate Traumatic

(b) Intermediate Callus implication

(c) Delayed Irritation neuritis

**(2) MUSCLES :**

- (a) Myositis ossificans
- (b) Volkmann's myositis fibrosa

**(3) JOINT :****(a) Ankylosis :**

- (a) Adhesions
- (b) Callus
- (c) Myositis ossificans

- (b) Osteoarthritis
- (c) Septic arthritis

**(4) ABNORMAL GROWTH WITH DEFORMITY:**

Malunited epiphysis

**(5) MAL-UNION :**

Treat (A) Upto three weeks

Manipulations

(B) Beyond three weeks

- (1) Immediate operative reduction
- (2) Late osteotomy

Ind (a) Ankylosis

(b) Cubitus valgus or varus

*General principles of the treatment of fracture lower end of the humerus*

**(I) REDUCTION**

By (A) Manipulations

Traction

↓ Local pressure

↓ Flexion elbow

(B) Traction Olecranon pin with elbow at right angle

(C) Operation

Ind (a) Failure of conservatism

(b) Separation of condyle or epicondyle

(c) Intra-articular comminution

(d) Epiphyseal separation

**(II) FIXATION :**

In (A) Extension fracture

Elbow flexed to 45°

Forearm supinated

Hand on opposite shoulder

Carrying angle maintained

(B) Flexion fractures

Elbow extended

By (1) A sling

(2) Bandage

(3) Posterior plaster slab with collar and cuff

### For Three weeks

### (8) RADIUS

**Etiology** Direct trauma  
Dislocation elbow

**Varieties**

- (1) **Crack fractures** With no displacement  
**Treat** (a) Sling for elbow  
In flexion  
For two weeks  
(b) Exercises fingers, shoulder  
elbow
- (2) **Marginal fractures** With displacement  
**Treat** Excision of the radial head
- (3) **Comminuted fractures**  
**Treat** Excision of the radial head  
**Time** Within first week  
**Tech** Whole head  
**Compl** Shortening of radius  
↓ Radial deviation of hand

Path	Displacement	lower fragment	forwards and upwards
------	--------------	----------------	----------------------

Treat (1) Reduction  
(a) Manipulations  
(b) Open operation      excision of head

(2) Fixation  
In Elbow flexed  
Forearm : supine  
By (a) Bandage  
(b) Posterior plaster cast  
(c) Sling

### (C) SEPARATION OF UPPER RADIAL EPIPHYSIS





(c) **Local manoeuvres**

- (a) Shake hand method
- (β) Palm torsion method
- (γ) Local pressure method

(2) **Fixation**In (a) **Forearm Pronated**+ (b) **Wrist**(a) **Extended**or (β) **Straight**or (a) **Forearm supine**+ (b) **Wrist flexed***Ind Recurring displacement*By (a) **Carr's cock-up splint (extension)**(b) **Todd's splint (flexion)**(c) **Plaster cast (any position)**Extent **Just below elbow to metacarpal heads**For **Five weeks**(3) **Physiotherapy**(A) **Splint method**(a) **Fingers, elbow shoulder immediate**(b) **Wrist**(a) **Flexion and extension**  
end of one week(β) **Adduction and abduction**  
end of two weeks(γ) **Pronation and supination**  
end of three weeks(B) **Bohler's plaster method**(a) **Fingers shoulder pronation and**  
**supination immediate**(b) **Wrist end of 3 to 5 weeks**  
(removal of plaster cast)Compl (1) **Valgus deformity with mal-union**Treat (a) **Upto three weeks manipulations**(b) **Three to eight weeks Thomas**  
**wrench**(c) **After eight weeks osteotomy**(2) **Adhesions of flexor tendon sheaths**(3) **Rupture extensor long pollicis tendon**  
during second month(4) **Stretching of or hæmorrhage in median nerve**(5) **Osteoarthritis of the wrist**(6) **Traumatic osteoporosis of carpal (Sudeck)**Cause **Hyperæmia**Clinic **Weakness, pain, trophic changes**X Rays **decalcification**

Diff. diag (a) T.B wrist  
 (b) Osteoarthritis wrist  
 Treat Plaster cast  
 Periarterial sympathectomy

(7) Weak wrist

(C) SMITH'S FRACTURE: Reversed Colles

Etio Fall on Hand abducted  
 Wrist flexed  
 Forearm supinated  
 Elbow flexed  
 Path Displacement Lower fragment forwards & outwards

(D) SEPARATION OF LOWER RADIAL  
 EPIPHYSIS with avulsion of metaphyseal  
 margin (Juxta-epiphyseal fracture)

Etio Age 2 to 20

Clinic Colles fracture in children

Compl (1) Fracture also  
 (a) Avulsion of ulnar styloid  
 (b) Separation ulnar epiphysis  
 (c) Greenstick fracture of ulna  
 (2) Ulnar nerve paralysis  
 Due to displacement of radial shaft

Treat As in Colles' fracture

Sequels Crushing of lower radial epiphysis  
 ↓ Premature epiphyseal union and arrested growth  
 Etio Falls on hand dorsiflexed to right angle  
 Clinic (1) Minus valgus  
 (2) Unequal lengths of ulna and radius  
 Treat (1) Epiphyseodesis of ulna excision  
 (2) Subperiosteal excision of lower end of ulna  
 ↓ Immobilization  
 By Plaster of Paris  
 For Four weeks

(E) RADIAL STYLOID FRACTURE

(1) Compression fracture  
 Etio (a) Back fire  
 (b) Fall on outstretched hand  
 ↓ Impact against the scaphoid  
 Treat (1) Reduction by lateral compression  
 ↓ Fixation  
 By Plaster of Paris  
 For Five weeks

(2) Avulsion fracture

Etio Inward dislocation of the wrist  
 ↓ Traction on external lateral ligament  
 Treat (1) Reduction traction → manipulations  
 ↓ (2) Fixation  
 By Plaster  
 For Five weeks



Site Junction of middle and lower third  
 Treat Tibial bone graft  
 ↓ *Complete immobilization*

#### (4) STYLOID PROCESS:

Etio Colles fracture  
 Treat (1) As in Colles fracture  
 + (2) Fixation in adduction of the hand

### (A) FRACTURES OF RADIUS AND ULNA

Etio (1) Direct trauma same level  
 (2) Indirect trauma (a) Radius upper third  
 + Ulna lower third  
 (b) Radius lower third  
 + Ulna middle third

Clinic (1) Shortened forearm  
 (2) Angular deformity  
 (3) Crepitus

Compl Cross union

Clinic Loss of pronation and supination

Treat (1) Reduction by  
 (1) Manipulations After strong sustained traction with counter traction  
 (2) Traction  
 (3) Open operation

#### (2) Fixation

In Elbow at right angles  
 Forearm: full supination

By (1) Posterior splint  
 (2) Plaster cast:  
 From metacarpal head to shoulder  
 (3) Operation  
 (a) Impaction  
 (b) Intramedullary peg  
 (c) Plating

For: Ten weeks

#### (3) After-treat

(a) Check X Ray films  
 (b) Changes in plaster  
 (c) Finger and shoulder exercises

*Indications for operative treatment of both the forearm bones*

#### (1) Persistent displacement

Treat Open reduction with or without internal fixation

#### (2) Fractures at the same level

#### (3) Cross union

Etio (1) Fracture of both the bones with mal union

- (2) **Post-operative** : failure of periosteal suture  
 ↓ Ossification of hæmatoma

**Clinic** **Loss of pronation and supination**

**Treat** **Operation**

- (a) Refracture and restoration of radius  
 + (b) Interposition of muscle

**After treat** : Fixation

In { Elbow right angles  
      Forearm mid position  
      Wrist straight

By Plaster of Paris

Extent Shoulder to metacarpus

For Eight weeks

#### (B) FRACTURE ULNA WITH DISLOCATION OF RADIAL HEAD

- Varieties** (1) Forward Angulation and dislocation  
 (2) Backward Angulation and dislocation

**Treat** (1) Forward:

- (a) Manipulative reduction

Traction → flexion to right angle → backward pressure

- ↓ (b) Fixation

In Elbow at right angles

By Plaster

Extent Shoulder to metacarpus

For Three weeks

- (2) Backward

- (a) Manipulative reduction

Traction → extension → forward pressure

- ↓ (b) Fixation

In Elbow extension

Rest as in (1) above

#### (C) FRACTURE RADIAL SHAFT WITH INFERIOR RADIO-ULNAR DISLOCATION

**Path** (1) Fracture Radius

- (a) Junction of middle and lower third

- (b) Inward angulation

+ (2) Rupture of inferior radio-ulnar joint ligaments

**Treat** (1) Manipulative reduction

- (a) Traction from the thumb

With Elbow at right angles

Forearm midway

Wrist adducted

- (b) Counter traction at the elbow

- (2) Fixation

In Elbow at right angles

Forearm midway

Wrist adducted

By Plaster of Paris

Extent Upper arm to metacarpal heads

For Ten weeks

After-treat (1) Finger and shoulder exercises

(2) Check X Rays

Compl (1) Recurrent angulation

Treat (a) Continuous thumb traction

(b) Skeletal transfixion

(c) Internal fixation

↓ Immobilisation for three months

(2) Non-union

## (10) CARPAL SCAPHOID or NAVICULAR

Etio Sprained wrist with fall on hand

Sites (1) Tubercle

(2) Proximal pole

(3) Waist

(4) Fracture dislocation

(A) Primary diagnosis

Clinic (1) Signs of wrist sprain

(2) Fullness and tenderness in anatomical snuff box

(3) Pain on percussion over the thumb tip

(B) Secondary diagnosis

Persistent sprain of the wrist

Diagnosis X Ray (a) Antero-posterior

(b) Lateral

(c) Oblique

(d) Delayed

In extreme ulnar deviation of hand

Compl (1) Non-union

(2) Post traumatic avascular necrosis

(3) Osteoarthritis wrist

(4) Kienboch's post traumatic dystrophy

(5) Weak wrist

Treat (A) Recent fracture

(1) Reduction By manipulations

Flexion and extension

↓ (2) Fixation

In Wrist hyper extended (40°) and abducted

By (a) Cock up splint

(b) Plaster cast Posterior or complete

Extent Metacarpal head to below the elbow

For: Twelve weeks

or X Ray evidence of complete union

(3) After treat leather support for six months

**(B) Old complicated fracture****Operative treatment**

- Ind (1) Non-union  
 (2) Avascular necrosis  
 (3) Arthritis wrist

**(1) Fracture scaphoid with delayed union**

Treat Uninterrupted, prolonged Complete fixation of the wrist

**(2) Fracture scaphoid with non-union**

Treat (a) Multiple drillings  
 (b) Bone graft

**(3) Fracture scaphoid with avascular necrosis**

Treat Excision of (a) Dead bone only  
 (b) Whole bone

Time Within a few weeks

Incision Radial side of ext. pol. long.

**(4) Fracture scaphoid with Arthritis wrist**

Treat Arthrodesis of wrist

In 20° dorsiflexion

By (a) Excision of radiocarpal and midcarpal cartilages

(b) Bone graft

After-treat Fixation for twelve weeks

**(11) METACARPALS**

- Eto (1) Direct trauma  
 (2) Indirect trauma punching  
 Sites (1) Base of the first  
 (2) Neck of the fifth

**(A) FRACTURES AT THE BASES OF THE METACARPALS:****(1) Fracture dislocation of the first metacarpal  
Bennett's fracture**

Eto Boxers

Falls on outstretched hand

Path Displacement shaft back and up (stave)

Treat (1) Reduction

(a) Manipulative

(b) Traction on extended and slightly abducted thumb

**(2) Fixation**

In (a) Flexion slight displacement

(b) Extension marked displacement

By (1) Bandage on a ball

(2) Verrill's splint

(3) Wire circle splint

(4) Pulp pin extension 4 weeks

- (5) **Plaster cast + wire finger splint**  
 Extent : forearm, dorsum of the hand  
 and thumb upto base of the  
 first phalanx

Compl : Painful ankylosis

- (2) **Simple fracture of the base of the 1st metacarpal**

Path : Displacement : angulation out and back

Treat : (1) Reduction by traction and manipulations  
 ↓ (2) Fixation

In Metacarpo-phalangeal joint : extended and  
 abducted

By : Plaster cast

Extent : From forearm to metacarpal heads

For : Four weeks

- (3) **Finger exercises**

## (B) FRACTURES OF THE SHAFTS OF THE METACARPALS:

- (1) **Spiral**

Etio : Falls on ulnar border

Sites : Third fourth and fifth metacarpals

Treat : (1) Reduction by manipulations  
 ↓ (2) Fixation by dorsal plaster cast for four  
 weeks

- (2) **Transverse**

Etio : Direct trauma

Sites : First and fifth

Treat : (1) Reduction by traction  
 ↓ (2) Fixation by dorsal plaster cast for four  
 weeks

Compl : Non union

- (3) **Punch Fracture shaft of the second metacarpal**

## (C) FRACTURES AT THE NECKS OF THE METACARPALS:

Treat : (1) Reduction by manipulations  
 (a) Flexion of metacarpo-phalangeal joint to  
 right angle  
 (b) Pressure backwards in the long axis of the  
 phalanx

- (2) **Fixation**

In : Finger flexed

By : Dorsal plaster cast

Extent : Upper forearm to tip of the finger

For : Three weeks

- (3) **Finger exercises**

**(12) PHALANGES****Principles in the treatment of finger injuries**

- (1) Injured finger must be immobilised in flexion
- (2) Every uninjured finger must be actively exercised and never passively stretched
- (3) Every fracture of a phalanx must be carefully reduced and fixed
- (4) Compound finger injuries must be immediately operated
  - (a) No suture of cut tendons
  - (b) No catgut to be used
  - (c) Early amputation of markedly crushed and infected finger
  - (d) Thumb must not be amputated

**Fracture of proximal phalanges****Treat** (1) **Reduction** By manipulations under local anaesthesia

- ↓ (2) **Kirschner's wire** through the pulp
- ↓ (3) **Plaster slab** Metacarpal joint to elbow joint
- ↓ (4) **Cramer wire** finger splint

Fingers with Knuckle joint  $45^{\circ}$   
 Mid joint  $90^{\circ}$   
 Terminal joint  $45^{\circ}$

- ↓ (5) **Extension** from Kirschner (2) to Cramer (4)  
For Three weeks
- ↓ (6) **Removal of the plaster** after four weeks
- + (7) **Finger exercises** immediate

**(13) THE PELVIS****(A) FALSE PELVIS:**

- Sites** (1) **Iliac crest**  
 (2) **Anterior superior iliac spine** Sartorius  
 (3) **Anterior inferior iliac spine** Rect. femoris

- Etio** (1) **Direct trauma**  
 (2) **Avulsion fractures** muscular action

- Treat** (1) **Firm flannel bandage**  
 (2) **Bone pegging**

**(B) TRUE PELVIS:****(1) COMPLETE RING FRACTURES****Etio** Run-overs and crushes

- Sites** (A) **Pubic segment** Bilateral fracture  
 (B) **Iliac and pubic** (a) Same side  
 (b) Opposite sides  
 (C) **Watson Jones** double division of pelvic ring

	Fracture with backward & upward dislocation of	
	(1) Symphysis pubis	
	+ (2) Sacro-iliac joint of either side	
Clinic	(1)	Severe shock with pain in pelvis
	(2)	Pain on lateral or antero-posterior pressure or separation
	(3)	Shortening of lower limb (in Watson Jones only)
	(4)	Crepitus
	(5)	Rectal examination
	(6)	X Rays (a) Antero-posterior
		(b) Lateral
		(c) Oblique
Compl	(1)	Injury to the urethra
	(2)	Injury to the bladder
		(a) Intraperitoneal
		(b) Extrapentoneal
	(3)	Injury to the rectum
Treat	(1)	Treatment of shock
	(2)	Treatment of visceral injury
	(a)	Pass in a catheter
	(b)	Make a rectal examination
	(A)	Rupture urethra
		(1) Suprapubic cystostomy
	↓	(2) External urethrotomy
	(B)	Rupture bladder
		(1) Suprapubic cystostomy
	↓	(2) Drainage above and below
	(C)	Fascial extravasation
		(1) Suprapubic cystostomy
	↓	(2) Multiple incisions & drainage
	(D)	Peritoneal extravasation
		(1) Laparotomy
	↓	(2) Peritoneal cleansing
	↓	(3) Bladder suture with drainage
	(E)	Rectal Laceration
		(1) Division of anal canal from anus to the rupture
	+	(2) Antiseptic pack
	+	(3) Iliac colostomy
	(3)	Treatment of Fracture :
	(1)	Reduction :
	By	(A) Bimanual manipulations
		(B) Lateral recumbency under general anaesthesia
Watson Jones fracture dial.	{	(C) Downward and forward pressure on iliac crest

**(2) Fixation :**

In Hips extended

By Plaster cast

Extent : Trunk, pelvis and both the thighs

For Six to twelve weeks

**(3) Quadriceps and knee exercises****(2) INCOMPLETE FRACTURES****(A) Acetabulum**Ftio (1) Lip of the acetabulum  
Dorsal dislocation of the hip(2) Floor of the acetabulum  
(a) Dislocation of the hip central  
(b) Direct trauma fall on trochClinic (1) Lip fracture easy reduction and  
recurrence of dis-  
location(2) Floor fracture  
(a) Impaction of femoral head  
(b) Rectal or vaginal exam.Treat (1) Reduction  
(a) Manipulations  
(b) Traction under anaesthesia(2) Fixation  
In Thigh abducted and extended  
By (a) Plaster of Paris  
or (b) Weight extension  
(a) Indirect  
(b) Skeletal

For Six weeks

(3) After treat Walking calliper for  
3 to 6 months**(B) Pubic ramus or symphysis**Treat (1) Bimanual reduction  
↓ (2) Recumbency for a few weeks**(C) Ischial tuberosity****(1) Fracture**

Etio Falls on buttocks

Clinic (1) Inability to sit  
(2) Local signs**(2) Separation of epiphysis**

Etio Traction of hamstrings in runners

**(D) Sacrum**Etio (1) Direct trauma  
(2) Indirect trauma



# Fracture with backward & upward dislocation of

Clinic	+	(1) Symphysis pubis
		(2) Sacro-iliac joint of either side
	(1)	Severe shock with pain in pelvis
	(2)	Pain on lateral or antero-posterior pressure or separation
	(3)	Shortening of lower limb (in Watson Jones only)
	(4)	Crepitus
Compl	(5)	Rectal examination
	(6)	X Rays (a) Antero-posterior
		(b) Lateral
		( ) Oblique
Treat	(1)	Injury to the urethra
	(2)	Injury to the bladder
	(a)	Intraperitoneal
	(b)	Extrapentoneal
	(3)	Injury to the rectum
	(1)	Treatment of shock
	(2)	Treatment of visceral injury
	(a)	Pass in a catheter
	(b)	Make a rectal examination
	(A)	Rupture urethra
	(1)	Suprapubic cystostomy
	↓	(2) External urethrotomy
	(B)	Rupture bladder
	(1)	Suprapubic cystostomy
	↓	(2) Drainage above and below
	(C)	Fascial extravasation
	(1)	Suprapubic cystostomy
	↓	(2) Multiple incisions & drainage
	(D)	Peritoneal extravasation
	(1)	Laparotomy
	↓	(2) Peritoneal cleansing
	↓	(3) Bladder suture with drainage
	(E)	Rectal Laceration
	(1)	Division of anal canal from anus to the rupture
	+	(2) Antiseptic pack
	+	(3) Iliac colostomy
	(3)	Treatment of Fracture :
	(1)	Reduction :
Watson Jones fracture disl.	{	By (A) Bimanual manipulations
		(B) Lateral recumbency under general anaesthesia
		(C) Downward and forward pressure on iliac crest

(2) **Fixation \***

In: Hips extended

By Plaster cast

Extent Trunk, pelvis and both the thighs

For Six to twelve weeks

(3) **Quadriceps and knee exercises**(2) **INCOMPLETE FRACTURES**(A) **Acetabulum**

Eto (1) Lip of the acetabulum

Dorsal dislocation of the hip

(2) Floor of the acetabulum

(a) Dislocation of the hip central

(b) Direct trauma fall on troch

Clinic (1) Lip fracture easy reduction and  
recurrence of dis-  
location

(2) Floor fracture

(a) Impaction of femoral head

(b) Rectal or vaginal exam.

Treat (1) Reduction

(a) Manipulations

(b) Traction under anaesthesia

(2) Fixation

In Thigh abducted and extended

By (a) Plaster of Paris

or (b) Weight extension

(a) Indirect

(b) Skeletal

For Six weeks

(3) After treat Walking calliper for  
3 to 6 months(B) **Pubic ramus or symphysis**

Treat (1) Bimanual reduction

↓ (2) Recumbency for a few weeks

(C) **Ichial tuberosity**(1) **Fracture**

Eto Falls on buttocks

Clinic (1) Inability to sit

(2) Local signs

(2) **Separation of epiphysis**

Eto Traction of hamstrings in runners

(D) **Sacrum**

Eto (1) Direct trauma

(2) Indirect trauma

- Clinic (1) Pain in the back  
 (2) Rectal or vaginal examination  
       sacral tenderness
- Compl (1) Rectal trauma  
 (2) **Sacral neuritis**
- (E) **Coccyx**
- Etio (1) Parturition  
 (2) Kicks
- Clinic Local signs rectal or vaginal  
       examination
- Compl **Coccydynia**
- Treat (1) Reduction via rectum and fixation  
 (2) Excision

## (14) FEMUR

### (1) UPPER END:

#### (A) FRACTURE NECK

- Varieties (1) **Anatomical**
- (a) **Subcapital** Intracapsular
- (b) **Basal** Extracapsular
- (c) **Trochanteric** (a) Inter  
                               (β) Per
- (2) **Etiological -**
- (a) **Abduction**  
       Subcapital impacted with valgus
- (b) **Adduction**  
       (α) Subcapital with varus  
       (β) Basal cervical & inter trochanteric or  
           extracapsular
- (c) **Contusion or direct trauma**  
       (α) Inter trochanteric  
       (β) Per trochanteric of Kocher

#### (1) **Abduction** Subcapital intracapsular with valgus

- Synonym **Latent fracture of Mouchet**
- Etio **Slight abduction strain in old women**
- Path Site junction of the head with the neck  
       Displacement Impaction
- Clinic (1) Slight eversion and abduction of thigh  
 (2) No loss of function
- Compl (1) **Avascular necrosis of femoral head**  
 (2) **Coxa valga**  
 (3) **Degenerative arthritis hip**
- Treat (1) **Rest in bed for a few weeks with knee exercises**  
 or (2) **Fixation**
- By **Plaster cast**
- Extent **Thorax to above the knee**
- For **Twelve weeks**
- With **Early locomotion and knee exercises**

## (2) Adduction fractures of the neck of the femur :

## (A) Subcapital Intracapsular with varus

Etiol Trivial trauma

Clinic (1) Deformity Eversion  $40^{\circ}$ - $50^{\circ}$  } of the lower  
 Shortening 0.5 1 } extremity  
 Adduction

## (2) Elevation of greater trochanter

(a) Nelaton's line

(b) Bryant's  $\Delta$ 

(c) Chiene's ||

(d) Shoemaker's lines

## (3) Relaxation of iliotibial band

## (4) X Rays

Diff. diag (1) Contusion of soft parts

(2) Dislocation of hip

(3) Osteoarthritis hip

Compl Non-union (a) Atrophic changes

(b) Avascular necrosis

Treat (1) Whitman

(2) Smith-Petersen Closed method

## (B) Basal cervical and inter trochanteric or extra capsular fracture

Etiol Indirect trauma due to a fall in younger people

Path (a) Eversion (1) More comminution and im-  
 paction posteriorly

(2) Gravity

(b) Shortening Impaction

Clinic All signs of (A) more marked

Treat (1) Whitman

(2) Smith Petersen

## (3) Contusion fractures of the neck of the femur

(A) Inter trochanteric Clinic and treat, as in (?) B above

## (B) Pertrochanteric fracture of Kocher

Etiol Direct violence in young people

Clinic (1) Local trauma

(2) Local signs of fracture

(3) Great trochanter independent of shaft

(4) X Rays

Treat (1) Nail fixation Smith Petersen

(2) Whitman

(3) Skeletal traction well leg traction

## (4) Separation of Epiphysis of femoral head

Etiol Age 18-23

Clinic Subcapital or intracapsular fracture

- Treat (1) As in subcapital fracture  
 (2) Open reduction

## (B) FRACTURE TROCHANTERS

### (1) Great trochanter

- Etio** (1) Contusion fracture  
 (2) Avulsion fracture
- Varieties** (1) Primary  
 (2) Secondary to pertrochanteric  
 (3) Separation of epiphysis
- Clinic** (1) Local signs  
 (2) Painful eversion  
 (3) Trochanter independent of the shaft  
 (4) X Rays
- Treat** (1) **Fixation**  
     In Thigh abducted and everted  
     By Plaster spica  
     For Six weeks  
 (2) Pegging

### (2) Small trochanter

- Etio** (1) Contusion fracture  
 (2) Avulsion fracture ilio-psoas
- Varieties** (1) Primary  
 (2) Secondary to pertrochanteric  
 (3) Separation of epiphysis upto 18
- Clinic** (1) Local signs  
 (2) Painful inability of flexion hip  
 (3) Trochanter independent of the shaft  
 (4) X Rays In eversion
- Treat** **Fixation :**  
     In Flexion 90° and eversion  
     By Plaster spica  
     For Six weeks

## Prognosis of fractures neck of the femur Panwel's groups

Angle of the line of the fracture with the horizontal is the most important factor in prognosis and treatment

- Group (I) 30° Good prognosis Conservative method  
 Group (II) 30°-50° Fair prognosis Smith Petersen  
 Group (III) 50°-90° Bad prognosis, Nailing + pegging

## Treatment of fracture neck of the femur :

- (1) Simple sand bag protection  
     Ind Very old debilitated patients
- (2) Thomas's hip splint with patten and crutches  
     Ind Old debilitated but ambulatory patients

**(3) Whitman's Abduction Plaster :**

Ind **Routine** where Smith Petersen not available or advisable

- Tech (a) Anesthesia local 2% novocain  
 (b) Disimpaction  
 (c) Reduction of fracture by  
 (a) Traction with countertraction in extension  
 (β) Abduction 40  
 (γ) Inversion disappearance of small trochanter  
 (d) Fixation

By : Plaster of Paris spica

Extent Chest to foot

For Twelve weeks

- (e) Calliper splint for six months

- Disadvantages (a) Long immobilization  
 (b) Stiff knee  
 (c) Non union  
 (d) Pulmonary embolism

- (4) **Smith Petersen** Three flanged stainless steel nail over a guide

- Essentials (1) Right length  
 (2) Right plane  
 (3) No loosening  
 (4) Full and immediate knee exercises  
 (5) Wire guide with directing apparatus  
 (6) Radiographical check in two planes

- Tech (A) Whitman's closed method  
 (1) Reduction of the fracture  
 (2) Immobilization in abduction and slight inversion  
 (3) Two plane radiographs  
 (4) Incision three inches over trochanter major  
 (5) Gouging a hole one-third inch wide in the cortex, half an inch below the lower margin of the trochanter  
 (6) Wire guide drive  
 (7) Two plane radiographs or screening  
 (8) Nail introduction over the guide  
 (9) Final two plane radiographs  
 (10) Closure of the wound  
 (B) Watson Jones' open method  
 Ind (a) Young and healthy  
 (b) Closed reduction impossible  
 (c) Non-union with interposition of soft parts

- Treat: (1) As in subcapital fracture  
(2) Open reduction

## (B) FRACTURE TROCHANTERS

### (1) Great trochanter

- Etio (1) Contusion fracture  
(2) Avulsion fracture
- Varieties (1) Primary  
(2) Secondary to pertrochanteric  
(3) Separation of epiphysis
- Clinic (1) Local signs  
(2) Painful eversion  
(3) Trochanter independant of the shaft  
(4) X Rays
- Treat (1) Fixation  
In: Thigh abducted and everted  
By Plaster spica  
For Six weeks  
(2) Pegging

### (2) Small trochanter

- Etio (1) Contusion fracture  
(2) Avulsion fracture ilio-psoas
- Varieties (1) Primary  
(2) Secondary to pertrochanteric  
(3) Separation of epiphysis upto 18
- Clinic (1) Local signs  
(2) Painful inability of flexion hip  
(3) Trochanter independant of the shaft  
(4) X Rays In eversion
- Treat Fixation  
In Flexion 90° and eversion  
By Plaster spica  
For Six weeks

**Prognosis of fractures neck of the femur** Panwel's groups

Angle of the line of the fracture with the horizontal is the most important factor in prognosis and treatment

- |             |         |                |                     |
|-------------|---------|----------------|---------------------|
| Group (I)   | 30°     | Good prognosis | Conservative method |
| Group (II)  | 30°-50  | Fair prognosis | Smith Petersen      |
| Group (III) | 50°-90° | Bad prognosis  | Nailing + pegging   |

**Treatment of fracture neck of the femur**

- (1) Simple sand bag protection  
Ind Very old debilitated patients
- (2) Thomas's hip splint with patten and crutches  
Ind Old debilitated but ambulatory patients

**(3) Whitman's Abduction Plaster :**

**Ind** Routine where Smith Petersen not available or advisable

- Tech** (a) Anesthesia local 2% novocain  
 (b) Diimpaction  
 (c) Reduction of fracture by  
 (a) Traction with countertraction in extension  
 (β) Abduction 40°  
 (γ) Inversion disappearance of small trochanter  
 (d) Fixation  
 By Plaster of Paris spica  
 Extent Chest to foot  
 For Twelve weeks  
 (e) Calliper splint for six months
- Disadvantages** (a) Long immobilization  
 (b) Stiff knee  
 (c) Non-union  
 (d) Pulmonary embolism

**(4) Smith Petersen** Three flanged stainless steel nail over a guide

- Essentials** (1) Right length  
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 (6) Wire guide drive  
 (7) Two plane radiographs or screening  
 (8) Nail introduction over the guide  
 (9) Final two plane radiographs  
 (10) Closure of the wound
- (B) Watson Jones' open method  
**Ind** (a) Young and healthy  
 (b) Closed reduction impossible  
 (c) Non-union with interposition of soft parts







*Displacements in fracture shaft of the femur*

- (1) Lateral
- (2) Overlapping
- (3) Angulation posterior lateral
- (4) Torsion eversion of lower fragment

*Treatment of fracture femoral shaft***(A) GENERAL CONSIDERATIONS**

- (1) Reduction by (A) Traction (a) Fixed (b) Mobile
- (2) Fixation by (B) Operation (A) Traction (B) Operation

**(1) Traction****(A) Fixed or Passive :**

Tech (1) Reduction of fracture by manipulations under anaesthesia

**(2) Fixation by**

- (a) Plaster of Paris From toes to chest
- (b) Thomas knee splint

Ind Fracture without displacement of the middle of the femur in young people

**(B) Mobile or Active or Weight traction****(1) Indirect Traction to the splint to which limb is tied**

- (a) Thomas knee splint
- (b) Hodgen

**(2) Direct Traction to the limb itself****(a) Superficial**

- (1) Adhesive strapping or glue
- (2) Vertical suspension Gallow's

Ind Infants and children

Position Slight abduction

Buttocks clear off the bed

Time Four weeks

After treat Walking calliper

**(b) Skeletal**

- (1) Calliper tongs
- (2) Steinmann's transfixion pin
- (3) Kirschner's wire

at (a) Above the adductor tubercle  
(b) Below and behind tibial tubercle

**(2) Splints used in fracture shaft of the femur :**

- (A) Thomas knee splint (a) Simple (b) With knee piece

- (B) Hodggen's
- (C) Gallow's: For children
- (D) Mc. Intyre: Fractures near the knee joint
- (E) Braun's
- (F) Hey Groves cradle splint

(3) **Supplementary devices in the treatment of fracture femur**

- (A) Multiplying pulleys exaggerate the force of extension
- (B) Hinged knee frame Mobilisation of knee
- (C) Wire frame foot piece Prevention of foot drop
- (D) Lateral traction correction of lateral angulation
- (E) Posterior pad keeping up of anterior femoral bowing

**Positions of fixation in fracture shaft of the femur**

- (A) Lower fragment in alignment with the upper
- (B) Correction of lateral displacement lateral straps
- (C) Correction of overlapping traction
- (D) Correction of angulation abduction of lower fragment
- (E) Correction of torsion inversion of lower fragment
- (F) Correction of posterior sagging posterior pad
- (G) Mobilisation of the knee Flexion of the knee with skeletal traction
- (H) Prevention of foot drop Right angled foot piece

**OPERATIVE TREATMENT OF FRACTURE SHAFT OF THE FEMUR**

- Ind (1) Open fractures
- (2) Complicated fractures
- (3) Persistent displacement inspite of efficient traction
- (4) Fracture neck of the femur Smith Petersen
- (5) Separation of trochanters or condyles
- (6) Non-union or Mal union
- (7) Adults

**ContraInd Sepsis**

**Operations (1) Plating**

Ind Transverse fractures Of the middle of the shaft

(2) **Pegging**

Ind Transverse fractures Near the extremities or of bony processes

- (a) Fractures of or about the trochanters
- (b) Fracture neck
- (c) Subtrochanteric fracture

(3) **Wiring or Bands :**

**Ind** Oblique or spiral fractures of the shaft  
 With the length more than twice the breadth

(4) **Bone graft**

(a) Surface

(b) Intramedullary peg

(c) Bone nail or peg

**Ind** (1) Transverse fractures Of the shaft

(2) Non-union

(3) (See under Pegging)

(5) **Step-cut or impaction after freshening****Ind** (1) Non-union

(2) Mal-union

Post-oper compl (1) Post-operative shock

(2) Sepsis

(3) Quadriceps fibrosis

*General after treatment of fracture of shaft of the femur*(1) **Traction or immobilisation**

For eight weeks (until pain and tenderness disappear)

↓ (2) **Immobilisation with walking calliper :**

(a) No weight bearing eight weeks

↓ (b) Gradual weight bearing sixteen weeks

+ (3) **Exercises** of knee and ankle joints

No full weight bearing should be allowed in fractures of femur till X Ray shows good bony union

**(B) TREATMENT OF INDIVIDUAL FRACTURES OF FEMORAL SHAFT****(1) SUBTROCHANTERIC :****Immobilisation****(A) In : Abduction of 45****By** (1) **Plaster splen** Adduction fractures(2) **Robert Jones abduction frame**

With traction for eight weeks

**Ind** abduction fractures**(B) In Abduction 45 + flexion 60****By** **Well-leg traction of Anderson :****Tech** (a) **Normal limb**

(a) Plaster from sole to upper thigh

(3) Incorporation of apparatus

(b) **Injured limb**

(a) Plaster from sole to upper calf

(3) Pin one inch above the ankle

**Traction** With normal limb pushed up injured limb pulled down

**For:** Twelve weeks

**After-treat** (a) Immediate quadriceps & toe exercises  
(b) 12 weeks removal of splint  
knee exercises  
(c) 16 weeks weight bearing

**Comp** (1) Stiff knee  
(2) Dislocation of sound femoral head

## (2) FEMORAL SHAFT

(A) Thomas bed knee splint with skin extension

**Tech** (1) Local anesth 20 c.c.s. of 2% novocain  
(2) Adhesive strips ankle to mid-thigh  
(3) Encircling non-adhesive bandage  
(4) Thomas splint with sling  
(5) Prevent (a) obliteration of anterior bowing  
(b) hyper extension of knee  
(c) eversion of the limb  
(d) drop-foot  
(6) Fasten the splint to raised foot of the bed  
(7) After treat (a) Toe and foot exercises  
immediate  
(b) Thigh muscle exercises  
3 weeks after  
(c) Walking calliper splint  
Ind Clinical union of fracture  
Upto Radiographic consolidation

**Comp** Of Thomas splint  
(a) Pressure sore  
(b) Stiff knee:  
Treat (a) Fixation in slight flexion  
(b) Quadriceps exercise from third week  
(c) Active joint exercises  
(d) Firm bandaging of knee and leg on weight bearing

(B) Braun's splint with skeletal traction

(1) Instrument Pin or Kirschner's wire  
(2) Site: Tibial tubercle  
(3) Weight 12 to 20 lbs.

(C) Anderson's ambulatory method

With multiple transfixion pins incorporated in plaster

## (3) SUPRA-CONDYLAR FRACTURE

**Fixation**

**In:** Knee flexion 45°

**By**

(A) Thomas splint angulated with skin extension

(B) Braun's splint with skeletal traction

- Tech (1) Angle of the splint behind the supra-condylar region  
 (2) Tibial tubercle transfixion pin with stirrup  
 (3) Weight twenty → ten pounds  
 (4) Raise the foot of the bed  
 (5) Weight extension from the sole  
 (6) Exercises  
 (a) Toe, ankle and quadriceps immediate  
 (b) Knee joint after 10 weeks  
 (c) Weight bearing after 12 weeks

*Complications of the fractures of the femoral shaft*

(1) Mal-union

(A) Angulation

- Treat (1) Osteotomy  
 ↓ (2) Fixation in Thomas splint

(B) Shortening

- Treat (1) Simple osteotomy of the callus  
 ↓ (2) Freshening of the surfaces  
 ↓ (3) Tibial transfixion extension

(2) Non-union

- Treat (1) Exposure  
 ↓ (2) Drilling and freshening  
 ↓ (3) Bone graft  
 ↓ (4) Plaster apica immobilisation

**(III) LOWER END OF THE FEMUR :**

(1) SEPARATION OF CONDYLES

Internal or external

- Etio (1) Falls on the knee Contusion  
 (2) Lateral bending of the knee Avulsion  
 Clinic (1) Joint effusion  
 (2) Local signs of fracture  
 Compl (1) Deformity genu varum or valgum  
 (2) Ankylosis knee  
 Treat (1) Conservative (See below)  
 (2) Open reduction

(2) T OR Y FRACTURES

- Etio Falls on feet or knee  
 Clinic (1) Joint effusion  
 (2) Local signs  
 (3) Broadened knee joint  
 Treat (1) Conservative (See below)  
 (2) Open operation

**(3) SEPARATION OF LOWER FEMORAL EPIPHYSIS****Etiology** Age 20-24 years**Cause** Forcible hyperextension**Path** Metaphyseal fractureDisplacement    Upper frag    backwards  
                                 Lower frag    flexed**Clinic** (1) History  
(2) Age  
(3) Joint effusion**Compl** (1) Gangrene foot  
(2) Ischaemic contracture of calf muscles**Treat** **Conservative** (For fractures lower femoral end)(1) **Reduction**

By Manipulations under anaesthesia

With Knee flexed to right angle

↓ (2) **Fixation**

In Knee flexed to 90° for 4 weeks

↓ flexed to 45° for 4 weeks

By (a) Bandage

(b) Anterior plaster shell

(3) **After-treatment**

(a) Knee exercises after 3 weeks

(b) Walking calliper for 6 months

**(15) PATELLA****(1) DIRECT SUBCAPSULAR Contusion****Etiology** Direct trauma**Path** Varieties

(a) Stellate

(b) Marginal

(c) Chip

**Displacement** nil**Clinic** (1) Local signs of trauma and fracture  
(2) Joint effusion**Treat** (1) **Fixation**

By (a) Posterior plaster slab

(b) Back splint with foot piece

For 3 weeks

↓ (2) Ambulatory plaster cast + Unna's dressings to leg

Extent Ankle to hip

For 4 weeks

↓ (3) Knee cage for 6 months

**Compl** (1) Too much joint effusion aspirate

(2) Comminution excise the patella



(2) **INDIRECT TRANSCAPSULAR Avulsion**

**Etio** Sudden quadriceps contraction to regain the lost balance

**Path** (a) Transverse at the junction of middle and lower third

(b) Aponeurosis torn and interposing

(c) Wide separation

**Clinic** (1) History of the accident

(2) Painful loss of knee extension

(3) Joint effusion

(4) Palpable gap between the fragments

**Compl** (1) Non-union

(2) Fibrous union Loss of extension

(3) Ankylosis

**Treat** Open operation

(1) **Primary operation** Five to six days after the trauma  
Local treatment + lavage of the joint

(A) **Wiring** (a) Circumferential

(b) Vertical

(B) **Suturing** (a) Aponeurosis

(b) Fragments (r) Circumferential  
(β) Vertical

**By** (1) Silk

(2) Chromic catgut no. 6

(3) Kangaroo tendon

(4) Fascia lata

(C) **Fascia lata encirclement** :

With immediate movements

(D) **Excision** : with suture of the aponeurosis : **Brooke**

**Tech** (1) Median longitudinal or curved transverse incision

(2) Lavage of the joint

(3) Removal of both the fragments

(4) Silk or fascial suture of the aponeurosis

**After-treat** (a) Firm bandage with no splint

(b) Removal of dressings and stitches after 10 days

(c) Walking after 15 days

(d) Normal work after six weeks

**After-treatment** of operative treatment of fracture patella

(1) Quadriceps massage : immediate

(2) Guarded active flexion : two weeks

(3) Normal function : two months

(4) Knee cage : six months

(2) **Secondary operation Two stage operation**

Ind Fibrous union with separation

(A) 1st stage Separation of and traction on the upper fragment and quadriceps

(B) 2nd stage Suturing or excision of the fragments

*Complications of operative treatment of fracture patella*

- (1) Sepsis of the joint
- (2) Ankylosis
- (3) Non union
- (4) Fibrous union
- (5) Osteoarthritis

(16) **TIBIA****Upper extremity**(A) **Tuberosities** (a) Outer (b) Inner

Eto (1) Direct contusion fracture

(2) Indirect valgus strain avulsion fracture

Path (1) Depressed fractures with fracture fibular neck

(2) Comminuted fracture with complete rupture of ligaments

Treat (1) Correction of valgus and depression of tuberosities

(2) Plaster immobilisation

(3) Quadriceps drill immediate and prolonged

(1) Depressed Fracture

(a) Manipulative reduction

strong traction

↓ full extension

↓ adduction

↓ lateral or ant-post. compression

(b) Fixation

In Knee extended

By: Unpadded plaster cast

Extend Toes to groin

For 10 weeks

(c) After-treatment

(1) Quadriceps drill immediate

(2) Weight bearing 8 weeks

(3) Removal of plaster 10 weeks

(4) Active knee movements

(5) Crepe bandage

(2) Comminuted Fracture

(A) Manipulative reduction

(a) Manipulations traction → adduction → compression

## ↓ (B) Fixation

In Knee extended

By Plaster cast

For III weeks

(c) Quadriceps drill and joint exercises

(B) Operative reduction + arthroplasty

↓ Plaster immobilisation for 12 weeks

Compl (a) **Avascular necrosis**(b) **Degenerative arthritis**(B) **T or Y intercondylar fracture**

Eti (1) Direct trauma fall on knee

(2) Indirect trauma fall on feet

(C) **Spine** In association with rupture of crucial ligaments

(See Internal derangements of the knee)

(D) **Separation of the upper tibial epiphysis**(E) **Tibial Tubercle**(1) **Fracture of tibial tubercle** Incomplete

Eti ( Forcible manipulations of the knee

Path ( Fractures and partial separation

Climc ( Local signs of fracture

Treat ( Active flexion exercises

(2) **Complete avulsion of Tibial tubercle epiphysis**

Eti ( High jumps

(1) Separation of separate ossification centre

Treat ( Operative suture

(2) Separation of continuous ossification centre

Treat ( Plaster immobilisation for 2 months

*General clinical features of fracture upper extremity of tibia*

(1) History of direct or indirect trauma

(2) Effusion into the knee joint

(3) Local signs of fracture

Compl (1) **Avascular necrosis**(2) **Joint** (a) Adhesions

(b) Osteoarthritis

(3) **Deformities** genu valgum or varum*Treat - of Fracture upper extremity of tibia in general*(A) **Slight displacement**

Rest over a pillow with early massage and movements

(B) **Marked displacement**(1) **Reduction** By traction + extension + manipulations

## (2) Fixation

In Knee extended or slightly flexed

By (a) Thomas knee splint

(b) McIntyre's splint

(c) Plaster case toes to groin

For 10 weeks

## (3) After-treatment

(a) Quadriceps drill

(b) Walking Calliper

(c) Weight bearing after 6 weeks

(d) Active knee exercises and crepe bandage

(e) Knee guard

## (C) Wide and persistent displacement + Bone pegging

## (II) SHAFT

Eti (1) Direct trauma transverse fractures

(2) Indirect trauma Oblique and spiral fractures

Path (1) Complete transverse oblique spiral

(2) Incomplete subperiosteal greenstick

Clinic Local signs

Treat

(1) Reduction (a) Manipulations

(b) Traction skeletal pin

(2) Fixation

In Knee flexed 10

Ankle at right angles

Leg in neutral position

By (a) Back splint with side pieces

(b) Braun's splint

(c) McIntyre's splint

(d) Thomas splint

(e) Plaster cast toes to groin

(3) After treat

(a) Weight bearing in 4 weeks

(b) Knee joint free in 8 weeks

(c) Plaster removal in 12 weeks

## (III) LOWER EXTREMITY

Varieties

In association with ankle fracture-dislocations

(A) Internal malleolus

(B) Transverse supramalleolar

(C) Separation of lower tibial epiphysis

- Etio** (1) Direct trauma  
 (2) Indirect trauma  
     (a) Eversion associated with Pott's  
     (b) Inversion associated with Wagstaffe
- Clinic** (1) History  
 (2) Local signs  
 (3) Periankle swelling and deformity
- Treat** (1) Reduction by manipulations under anaesthesia  
 (2) Fixation  
     In Foot inverted  
     By Plaster of Paris  
**Extent** Toes to tibial tubercle  
**For** 6 to 8 weeks  
 (3) After treatment  
     (a) Toe and knee exercises  
     (b) Raising the inner side of the sole

### *Treatment of special fractures of tibia*

- (1) Oblique fractures of tibial shaft  
 (A) Manipulative reduction → plaster fixation  
 (B) Skeletal traction  
 (C) Operation  
     Ind Failure of A and B above  
     Tech Exposure  
         ↓ Reduction  
         ↓ Fixation by pin (projecting)  
         ↓ Plaster fixation  
**After-treat** Removal of pin after 2 weeks  
                 Removal of plaster after 6 weeks
- (2) Fracture tibia with slow union  
**Site** Lower half  
**Cause** (a) Insufficient vascularity  
         (b) Inefficient immobilisation  
**Treat** Complete immobilisation till complete union
- (3) Un-united fracture of tibial shaft  
**Treat** (1) Bone graft  
         (2) Double tibiofibular synostosis
- (4) Open fractures of tibial shaft  
**Treat** (1) Exploration  
         (2) Debridement  
         (3) No sutures  
         (4) Pin incorporated in plaster with window  
         (5) Weight traction over Braun's splint
- (5) Infected fracture of tibial shaft:  
**Treat** Winnett or Changed every month

## (17) FIBULA

- Etio** (1) Direct trauma anywhere in the shaft

- (2) **Indirect trauma**  
 (a) **Pott's fracture**  
 (b) **Neck** In knee torsions
- Path** (1) **Isolated**  
 (2) **Complicated** Associated with  
 (a) Fracture external tuberosity of tibia  
 (b) Rupture of the knee ligaments  
 (c) Fracture dislocation ankle
- Clinic** Local pain referred by springing of the fibula
- Treat** (1) Crepe bandage  
 (2) **Plaster-of Paris fixation**
- Compl** (1) Trauma to ext. popliteal nerve (fracture neck)  
 (2) Rupture of ext. lateral ligament of knee

*Fracture both the bones of the leg —*

- Etio** (1) **Direct trauma** same level  
 (2) **Indirect trauma**  
 (a) Tibia junction of lower and middle third  
 (b) Fibula upper end or middle
- Path** Displacement upper frag forwards  
 lower frag backwards + upwards  
 + everted  
 overriding and lateral displacement
- Clinic** Local signs of fracture
- Treat** (A) **Conservative Traction — immobilisation**  
 (1) **Reduction** By  
 (a) **Manipulations** under anaesthesia  
 (b) **Traction** tibial traction apparatus
- Tech** (1) Position leg hanging vertically  
 ↓ (2) Insertion of pin one inch above the ankle  
 ↓ (3) Reduction of fracture (a) Strong traction by stirrup  
 ↓ (b) Manual lateral pressure  
 ↓ (4) Application of plaster  
 By (a) Plaster slab toes to upper calf  
 (b) Plaster cast toes to tibial tubercle  
 ↓ tibial tubercle to mid thigh  
 In Knee flexed to 135°  
 For: 8-10 weeks
- ↓ (5) **Continuous traction:**  
 Ind Unstable oblique or spiral fracture
- Tech** (1) **Brown's splint**  
 (2) 15 pounds traction attached to the stirrup  
 (3) Raise the foot of the bed

## ↓ (6) Removal of pin and replaster :

Ind Subside of swelling

Tech (a) Limb in tibial traction apparatus

(b) Renewal of plaster

toes to groin

knee slightly flexed

(c) Removal of pin

## (7) Duration of immobilisation :

(a) 8-10 weeks

(b) Clinical union

(c) Radiographic union

## (8) After-treat (a) Unna's paste dressing from toes to knee

(b) Crepe bandage to the knee

(c) Toe drill immediate

## (2) Fixation

In Knee flexed 10°

Leg straight and neutral

Ankle at right angles

By (A) Splints

(a) Back splint with foot and  
side pieces

(b) McIntyre splint

(c) Braun's splint

(B) Plaster-of-Paris

(a) Ordinary

(b) Bradawls

(C) Traction Pin or Wire

At (a) Tibia

(b) Os calcis

With weight

## (3) After treatment

(a) Traction for 4 weeks

(b) Weight bearing after 6 weeks

## (B) Operative Treatment

Ind (1) Primary

(a) Open and infected fractures

(b) Failure of traction

(2) Intermediate mal union

(3) Delayed non-union

Operations (1) Lane's plates Transverse shaft  
fractures

(2) Bands &amp; wires Oblique fractures

(3) Intramedullary pegs Transverse  
fractures

(4) Inlay grafts Non-union

After treat Plaster from toes to mid thigh  
for 8-10 weeks

# (18) FRACTURE DISLOCATIONS ROUND ABOUT ANKLE JOINT

## (1) ABDUCTION AND EVERSION INJURIES POTT OR POTT-DUPUYTREN

- (A) Fracture external malleolus
- (B) (1) Fracture external malleolus  
+ (2) Rupture internal ligament  
+ (3) Outward dislocation astragalus
- (C) (1) Fracture external malleolus  
+ (2) Rupture internal ligament  
+ (3) Posterior marginal tibial fracture  
+ (4) Out and back dislocation astragalus
- (D) (1) Oblique fracture of the fibula  
Within three inches of ankle  
+ (2) Rupture internal ligament  
or (3) Avulsion internal malleolus } **Pott**

## (2) ADDUCTION AND INVERSION INJURIES

- (A) Fracture internal malleolus
- (B) (1) Fracture internal malleolus  
+ (2) Rupture external ligament  
+ (3) Inward dislocation astragalus } **Wagstaffe**
- (C) (1) Fracture internal malleolus  
+ (2) Rupture external ligament  
+ (3) Posterior marginal tibial fracture  
+ (4) In and back dislocation of astragalus

## (3) VERTICAL COMPRESSION INJURIES

### Excessive dorsiflexion

- (A) (1) Anterior marginal tibial fracture  
+ (2) Forward dislocation astragalus  
+ (3) *Communited fracture malleoli*
- (B) (1) Rupture of tibio-fibular  
interosseous ligament  
+ (2) Central dislocation of astragalus } **Dupuytren**

## (4) DIRECT TRAUMA FRACTURES

- (A) Fracture both bones just above the ankle
- (B) Supramalleolar transverse tibial fracture
- (C) Separation of lower tibial epiphysis

## (5) EPIPHYSIAL INJURIES

- (A) Abduction rotation displacement out and back
- (B) Adduction injuries

Etiol Inversion strain

Path Compression of lower tibial epiphysis

↓ Premature union

↓ Talipes varus



- Treat (1) Osteotomy after 20  
(2) Epiphysodesis

*Signs and symptoms of the fractures round about the ankle*

(A) Deformities : Displacements

- (1) Backward displacement of the foot
  - (a) Short dorsum
  - (b) Prominent heel
- (2) Outward or inward lateral displacement
- (3) Inversion or eversion Wagstaffe or Pott
- (4) Broadening of malleoli Dupuytren
- (5) Foot-drop

(B) Ankle joint effusion

*Treatment of fractures round about the ankle*

(A) GENERAL CONSIDERATIONS :

(1) Conservative

- (1) Reduction (A) Manipulations Under  
anæsthesia with  
flexion of the knee  
joint
- (B) Traction :  
os calcis pin

(2) Fixation

In Foot { at right angles  
no lateral displacement  
no posterior displacement  
slight inversion

- By (a) Stockinet suspension  
(b) Splint Footpiece with raised  
inner border + side  
leg piece

(c) Plaster-of Paris

- (a) Plaster with pin & stirrup  
extension
- (b) Delbet walking plaster  
Walk with stick 7 days  
Walk with no stick 12 days  
Plaster removal 60 days

(d) Os calcis pin traction 3 weeks

- (3) After treat (a) Toes and knee  
exercises immediate
- (b) Thickening sole  
margins 3 months

## (II) Operative

- Ind (A) Primary (1) Dupuytren  
 (2) Loose fragments  
 (3) Compound fractures

## (B) Secondary Deformities

Treat Osteostomy above the ankle

↓ Plaster fixation for 3 weeks

## (B) TREATMENT OF INDIVIDUAL INJURIES

## (1) ABDUCTION-EVERSION INJURIES

## (A) Fracture external malleolus with no displacement

(a) Strapping

+ (b) Leriche's

Local injection of anaesthesia

+ (c) Walking plaster for 3 weeks

## (B) Fracture external malleolus + avulsion int. ligament

(a) Manipulative reduction of astragalus  
 Inward pressure on external malleolus

↓ (b) Fixation

By Plaster-of-Paris

Extent Toes to tibial tubercle

For 10 weeks

## (C) Fracture Malleolus with out and back displacement

(a) Manipulative reduction

Pull the foot forwards & inwards

(b) Fixation

By Plaster

Extent Toes to tibial tubercle

For 10 weeks

## (2) ADDUCTION INVERSION FRACTURES

Treatment same as in abduction-eversion fractures the manipulations being in the opposite direction

## (3) VERTICAL COMPRESSION INJURIES

## (A) Manipulative

(a) Posterior plaster slab with elevation

Till swelling disappears

↓ (b) Manipulative reduction

Push foot backwards & downwards

↓ (c) **Fixation**

In Plantar flexion  
By Plaster-of Paris  
Extent Toes to tibial tubercle  
For 12 weeks

(B) **Os calcis skeletal pin extension** on  
Braun's splint for 6 weeks  
Ind Failure of manipulative reduction

*Complications after fracture dislocations of ankle*(1) **Mal-union with deformities**

Treat (A) **Late manipulations** upto six weeks

- (a) Manual
- (b) Wedge
- (c) Wrench
- (d) Osteoclast

(B) **Operative reduction**

(C) **Osteotomy of the tibia**

Ind Talipes valgus

Site One inch above ankle

(D) **Arthrodesis of ankle**

With Tibial graft

In Neutral position

Equinus 5-10°

After treat Padded plaster 3 weeks

Unpadded cast with weight bearing  
10 weeks

(2) **Ankylosis of the ankle**

(3) **Osteoarthritis of the ankle or knee**

(4) **Tenosynovitis**

**(19) OS CALCIS**

Etiol Falls from a height Ladder workers

Classic (A) **Isolated fractures without joint injury**

- (a) Vertical fracture of medial process of tuberosity
- (b) Horizontal fracture of medial tuberosity
- (c) Sustentaculum tali

(B) **Comminuted fracture with minimal joint injury**

- (a) **Flare fracture**
- (b) Fracture outer wall and body

(C) **Comminuted fracture with severe joint injury**

- (a) Outer part of posterior articular surface
- (b) Whole posterior articular surface
- (c) Anterior articular surface

- Sites
- (1) Tuberosity heel
  - (2) Neck
  - (3) Sustentaculum tali
  - (4) Body
  - (5) Articular surface

- Clinic (1) History of a fall from height  
 (2) Painful and tender heel  
 (3) Oedema and ecchymosis round the heel  
 (4) Local broadening (as seen from the back)  
 (5) Spasm of the tendons  
 (6) Antero-posterior and lateral X Ray plates

Treat

(A) General Principles

- (1) Reduction By manipulations under anaesthesia  
 (2) Fixation  
     In Foot at right angles  
               slightly inverted  
               arch restored  
     By Plaster cast  
     For 2 months  
 (3) After treatment (a) immediate toe and knee exercises  
                          (b) gradual weight bearing

(B) Individual fracture treatment

(1) ISOLATED FRACTURES

- (A) Vertical fracture of the tuberosity  
     (a) Walking plaster for 6 weeks  
     ↓ (b) Viscopaste dressings  
 (B) Beak fracture  
     (a) Manipulations with foot in plantarflexion  
     + (b) Walking plaster in slight plantarflexion for 6 weeks  
     ↓ (c) Viscopaste dressings  
 (C) Avulsion fracture of tuberosity  
     Operative fixation by catgut  
 (D) Scutcheon Tail  
     Walking plaster for 6 weeks

(2) COMMUNUTED FRACTURES WITH MINIMAL JOINT INJURY

- Fixation  
     By Plaster-of-Paris  
     Extent Toes to tibial tubercle  
     For 6 weeks  
     With Immediate weight bearing

(3) COMMUNUTED FRACTURES WITH JOINT INJURY

- (a) Crepe bandage from toes to knee  
     + Elevation of leg till oedema disappears  
 ↓ (b) Reduction by  
     (1) Transfixion pin  
         (a) Double (a) Os calcis  
                       (b) Supra-malleolar  
         (b) Single  
     + (2) Bohler's compression clamp  
 ↓ (c) Fixation  
     By Plaster-of-Paris  
     Extent Toes to tibial tubercle

### III. BONE INFLAMMATIONS

#### (I) POST TRAUMATIC INFLAMMATIONS

##### (A) PERIOSTEUM

- (A) *Acute traumatic periostitis* } trauma + infection  
 (B) *Chronic traumatic periostitis* }  
 (C) *Traumatic ossifying periostitis of the new born*  
 Etio *Twisting traction of the limb by an accoucher*  
 Site (1) *Humerus* (2) *Femur*  
 Path *Tearing and separation of periosteum and epiphysis → ossifying periostitis*  
 Clinic (1) *Painful movements*  
 (2) *Swelling*  
 (3) *Ecchymosis*  
 Treat *Conservative*

##### (B) EPIPHYSIS

###### (i) OSTEOCHONDRITIS JUVENILIS CHONDRO EPIPHYSITIS

Def *Chronic inflammation occurring in the epiphysis subject to undue repeated stresses and strains and at an age determined by the time of appearance and fusion of the affected epiphysis*

- Etio (1) *Repeated minor strains and stresses*  
 (a) *at particular age*  
 (b) *at particular site*  
 (2) *Hypothyroidism (Med. Ann. 1940)*  
 Path *Morb. anal. epiphyses*  
 (a) *Partial arrest and irregularity*  
 ↓ (b) *Sclerosis*  
*Theories*  
 (A) *Post traumatic*  
 (a) *Partial separation due to minor trauma*  
 (b) *Avascular necrosis traumatic*  
 (B) *Insidious*  
 (a) *Aseptic embolism*  
 (b) *Low grade infection*  
 (c) *Hypothyroidism*

Sites

- Clinic (1) *Insidious* *No history of trauma*  
 (2) *Post-traumatic*  
 (a) *Immediate & acute*  
*partial separation of epiphysis*  
 (b) *Delayed and gradual*  
*avascular necrosis of fracture fragment*

**(1) Osteochondritis of the hip Von Parthe**

Etiology Age 5-10 years

Path Post traumatic avascular necrosis of femoral head

Clinic (A) Onset

(1) Slightly painful limp

(2) Hip spasm in flexion + adduction

(B) Active

(1) Restricted abduction and inversion

(2) Free flexion and extension

(C) Recovery

(1) Limitation of abduction

(2) Coxa Vara

Signs (1) Palpation: Thickened and prominent trochanter

(2) X Ray

(a) Mushroomed fragmented head

(b) Broadened and shortened neck

Compl (1) Coxa Vara

(2) Osteoarthritis

Treat (1) Acute Stage recumbency and traction

(2) Subacute immobilisation of the hip

(3) Chronic walking calliper

Complete freedom from weight bearing and continuous traction for twelve to twenty-four months

**(2) Tibial apophysitis Osgood Schlatter**

Def Avulsion osteochondritis of the tibial tuberosity

Etiology Boys between 10 and 16

Predisposers (1) Trauma

(a) traction avulsion

(b) direct contusion

(2) Separate developmental centre

Clinic (A) Insidious

(1) No history of trauma

(2) Painful tender swollen tubercle

(B) Traumatic

(1) History of Injury

(2) Painful knee extension

(3) Painful tender swollen tubercle

X-Rays

+	(a) Fragmentation	} of the tubercle
+	(b) Partial separation	
+	(c) Bony sclerosis	

**Treat Fixation**

- in knee fully extended
- by Plaster-of Paris
- extent Toes to the groin
- for three months
- ↓ (2) Walking splint with Calliper
- for three months
- ↓ (3) No athletics
- for three months

**(3) Apophysitis of os calcis Sever's**

**Def** Osteochondritis of the epiphysis of the os calcis

**Etio** Boys between 10 and 16

Trauma

- Clinic**
- (1) Painful lumping
  - (2) Tender heel
  - (3) X Ray fragmentation and irregularity of epiphysis

- Diff diag**
- (1) Spur
  - (2) Periostitis
  - (3) Burnitis
  - (4) Fibrositis

**Treat** Boot with cut back and raised heel

**(4) Osteochondritis of the tarsal navicular Kohler**

**Etio** Boys between 3 and 8

Cause stress and strain

**Path** Avascular necrosis

- Clinic**
- (1) Painful limp
  - (2) Painful tender swollen navicular
  - (3) X Ray smaller irregular denser bone

**Diff diag** T B Tarsus

- Treat**
- (1) Recumbency with strapping
  - ↓ (2) Walking plaster
  - ↓ (3) Raise the inner border of the sole

**(5) Osteochondritis of the second metatarsal head Freiburg**

- Clinic**
- (1) Local pain tenderness and swelling
  - (2) X Ray fattening irregularity and sclerosis

- Treat**
- (1) Conservative
  - (2) Excision of the metatarsal head

**(6) Osteochondritis of lower radial epiphysis Madelung**

**Etio** Adolescent girls between 15 and 25

Typists

- Path**
- (1) Deficient growth of lower radial epiphysis
  - (2) Normal ulna

Clinic **Manus valgus** Hand displaced outwards and forwards

(7) **Vertebral epiphysitis** Scheuermann—Calve

Etio Age between 10 and 20

Sites Surfaces of thoracic or upper lumbar vertebrae

Clinic (1) Pain tenderness, deformity (kyphosis)

(2) No fixity and spasm

(3) X Ray (a) Irregularity and density of vertebral margins

(b) Narrow intervertebral space

(8) **Post traumatic carpal dystrophy** Keinboch

Def Post traumatic osteochondritis of carpal semilunar

Etio: (1) Adults—girls between 6–16 yrs.

(2) Trauma sprain of the wrist

Path (1) Alteration in structure

+ (2) Irregular patchy decalcification + sclerosis

Theory Avascular necrosis

Clinic (1) History of trauma

(2) Recurrence of wrist disability

(3) Local pain tenderness, swelling

(4) Finsterer's sign Pain on tapping 3rd metacarpal head

(5) Head of third metacarpal less prominent

(6) X Ray irregular patchy density

Diff diag (1) Non-union of fracture navicular

(2) Sprain wrist

(3) T. B. Wrist

(4) Osteoarthritis wrist

} Wrist affections

Treat Fixation in plaster for six months

↓ Leather support for one year

(II) **OSTEOCHONDRITIS DISSECANS**

Etio (1) Trauma repeated and slight

(2) Thrombosis

Path Avascular bone necrosis

Sites knee elbow ankle

(C) **BONE:**

(1) Post traumatic rarefying osteitis and spondylitis

(2) Avascular necrosis

(See under fracture complications)



## (II) INFECTIVE INFLAMMATIONS OF THE BONE

## (A) PERIOSTEUM

## (1) INFECTIVE PERIOSTITIS

Etio Infection from

- (A) External (1) Trauma (a) closed  
(b) open  
(2) Infection from soft tissues

(B) Local Contusion

(C) Internal Osteomyelitis

(D) Circulation Specific

- Path (1) Hyperæmia  
(2) Separation from underlying bone  
(3) Subperiosteal abscess or new bone formation  
(4) Superficial necrosis of bone  
(5) Periosteal perforation  
(6) Soft tissue abscess  
(7) Sinus

- Clinic (A) Acute (See under acute osteomyelitis)  
(1) Localized painful tender swelling adherent to a bone  
(2) Acute overlying inflammation  
(3) General toxæmia  
(B) Subacute As in (A) but milder  
(C) Chronic (See under chronic osteomyelitis)  
(1) Nodular or diffuse fusiform hard swelling on the bone surface  
(2) Unhealing ulcer or sinus

- Signs \ Ray (1) Acute raised periosteal line  
(2) Chronic bony thickening or erosion

- Compl (1) Subperiosteal bone formation: Syphilis  
(2) Subperiosteal suppuration Pyogenic infection  
Tuberculosis

- (3) Osteomyelitis  
(4) Necrosis of underlying bone  
(5) Non-healing ulcer or sinus  
Treat (1) Conservative  
(A) Local rest, elevation, immobilization, counterirritation hyperæmia  
(B) General (a) antiseptic  
(b) antispecific  
(2) Operative  
Ind (1) Subperiosteal abscess  
(2) Chronic periostitis

Tech (1) Periosteal incision and drainage

(2) Periosteal incision and scraping

(2) LEONTIASIS OSSEA (See Face)

(3) SPECIFIC PERIOSTITIS (See under specific affections of bone)

## (B) BONE

(1) ACUTE AND SUBACUTE INFECTIVE OSTEOMYELITIS

Def Pyogenic Septicæmia with metastatic suppurative inflammation starting as a localized focus in a bone and rapidly spreading to its component parts causing widespread necrosis and suppuration

Eto Age 3 to 10

Sex Boys

Predisposers (1) Trauma Juxta-epiphyseal hæmatoma  
(2) Infective focus Boil furunculosis  
(3) Low general resistance

Bact (1) Staphylococcus aureus and albus  
(2) Streptococcus  
(3) Pneumococcus

Path Suppuration under tension in a rigid cavity

Sites of origin (1) Metaphyseal Long bones  
(2) Subperiosteal Flat bones  
(3) Epiphyseal  
(4) Medullary Short bones

Factors for site (A) Blood supply  
(1) Metaphyseal system (long bones)  
Metaphysis  
(2) Subperiosteal system (flat bones)  
Periosteum  
(3) Nutrient artery (short bones)

Modulla

(B) Embryonic nature Of the metaphysis

Morb. anat (a) Juxta-epiphyseal hæmatoma  
+ (b) Septicæmia from a septic focus  
↓ (c) Metaphyseal abscess  
↓ (d) Spreading inflammation under tension

- (b) Brodie's abscess
- (c) Epiphyseal separation
  - (a) Deformity
  - (b) Stunted growth
- (d) Spontaneous fracture
- (2) Joints
  - (a) Sympathetic effusion
  - (b) Infective effusion Via
    - (1) Periosteum and capsule
    - (2) Intra-articular metaphyses
    - (3) Epiphysis
    - (4) Intra-articular tendon
    - (5) Blood borne synovium
  - (c) Ankylosis
  - (d) Pathological dislocations
- (3) Muscles & Tendons Stiffness and fibrosis
- (4) Nerves Inclusion in fibrosis
- (5) Blood vessels
  - (a) Secondary hæmorrhage
  - (b) Thrombosis and septic embolism
- (C) Special
  - (1) Skull
    - (a) Sinus thrombosis
    - (b) Extradural abscess
    - (c) Meningitis
  - (2) Mandible
    - (a) Cervical cellulitis
    - (b) Edema glottis
    - (c) Aspiration or septic pneumonia
    - (d) Cancrum oris
  - (3) Vertebrae
    - (a) Mediastinitis
    - (b) Empyema
    - (c) Psoas abscess
  - (4) Pubis Hæmatoma

## Treatment

- Principles
- (1) Decompression and Drainage Starr
  - (2) Closed antiseptic immobilization orr
  - (3) Sequestrotomy When required

### (A) General treatment

- (1) Specific
  - (1) Sulphonamide group.
    - (a) Oral
    - (b) Injections
  - (2) Antisera
  - (3) Immuno-transfusion

- (2) **Eliminative treatment** **Laxatives and diuretics**
- (3) **Tonics** **Iron**
- (B) **Local treatment** (for operative details see under Bone operations")
  - (1) **Uncomplicated acute osteomyelitis**
    - (a) **Periosteal incision and drainage**
    - ↓ (b) **Starr's treatment** **Multiple drilling or trephining**
      - Ind **Non-amelioration within 24 hours after periosteal incision**
    - (c) **Diaphyseal drainage** **Gutter operation**
      - Ind (a) **Medullary osteomyelitis**
      - (β) **Metaphyseal osteomyelitis spreading to medulla**
      - (γ) **Chronic osteomyelitis**
    - (d) **Sub-periosteal resection of diaphysis**
      - (1) **Total**
      - (2) **Partial**
        - Ind (a) **Sub-acute osteomyelitis**
        - (β) **Separation of the whole periosteum**
  - (2) **Acute osteomyelitis with suppurative arthritis** (Of the knee)
    - Sites (1) **Lower end of the femur**
    - (2) **Upper end of the tibia**
    - Tech (1) **Aspiration of the joint** → **Bacteriological exam.**
      - (a) **If sterile** **Leave alone**
      - (b) **If infected**
        - (a) **Repeated intermittent aspirations**
        - ↓ (β) **Arthrotomy and drainage**
        - ↓ (γ) **Amputation**
          - Ind (i) **Low general condition**
          - (ii) **Pyæmia**
          - (iii) **Bad local condition**
    - + (2) **Operation for acute osteomyelitis**
  - (3) **Septicæmia multiple foci of osteomyelitis and suppurative arthritis**
    - (1) **General antispecific treatment**
    - ↓ (2) **Local treatment as required**

*After-treatment of osteomyelitis*

- (1) **Splinting with weekly dressings**

## (2) Winnett orr

- (a) Drying the bone with iodine and spirit
- (b) Sterile vasoline or paraffin gauze pack
- (c) No sutures
- (d) Plaster-of Paris closure for 4-8 weeks.

*Sequence of treatment of acute osteomyelitis*

## (1) General

## ↓ (2) Local

- (a) Periosteal incision and drainage  
Ind Primary stage
- ↓ (b) Starr's multiple drilling or trephining  
within 24 hours of (a)
- ↓ (c) Diaphysal drainage or Gutter operation  
Subacute stage
- ↓ (d) Sequestrotomy Chronic stage
- ↓ (e) Subperiosteal resection of diaphysis  
Chronic stage
- ↓ (f) Amputation Life in danger

*Amputation for acute osteomyelitis*

## Indications

- (1) General
  - (a) Fulminating toxæmia
  - (b) Septicæmia
  - (c) Pyæmia
  - (d) Chronic amyloid toxæmia
- (2) Local
  - (a) Acute infective arthritis
  - (b) Secondary hæmorrhage
  - (c) Spontaneous fracture

*Some special sites of osteomyelitis*

## (1) Upper end of the Femur

- Site (a) Capital (Joint infected secondarily)
- (b) Great trochanter

## Treat Early operation

- (1) Drilling of femoral neck through the trochanter
- (2) Drainage of hip joint if necessary

- Seq (1) Shortening
- (2) Ankylosis

## (2) Maxilla

Etiology Age Children

- Path (a) Periostritis
- (b) Osteomyelitis

- Clinic (1) Profound toxæmia with high temp.
- (2) Unilateral swelling of the face
- (3) Orbital cellulitis
- (4) Superficial Abscess

Complications Intracranial Sinus thrombosis, Meningitis Brain abscess

- Treat (1) Conservative
- (2) Conservative operations Incisions into the mouth

## (2) CHRONIC INFECTIVE OSTEOMYELITIS

Etio	(1)	Post-acute	Sequela of acute osteomyelitis
	(2)	Traumatic	Contusions infected fractures
	(3)	Insidious	
Path	(1)	Sequestrum	Dead bone
	(2)	Involucrum	Subperiosteal new sclerosed bone surrounding the sequestrum
	(3)	Cloacae	Apertures or sinuses in the involucrum leading to the cavity containing the sequestrum
		Processes	(a) Sclerosis (b) Rarefaction (c) Necrosis (a) Molecular (β) En masse
Clinic	(1)	Hard irregular swelling of a bone	
	(2)	Abscess near about a bone	
	(3)	Sinus	
	(4)	X Ray	
Treat	(1)	Sequestrotomy	
	↓ (2)	Winnett orr	

*Some special varieties of chronic suppurative osteomyelitis*

## (A) Diffuse osteoperiostitis Chronic hypertrophic osteomyelitis

Etio Adults 10-20 years

Sites Humerus femur tibia

Path Diffuse sclerosis of the whole circumference of the whole length of the bone (Subperiosteal and endosteal)

Clinic (1) Boring pain with deep tenderness  
(2) Diffuse fusiform diaphysial sclerosis  
(3) X Rays diffuse sclerosis  
patchy rarefaction  
medullary narrowing

Diff Diag (1) Callus  
(2) Diffuse syphilitic periostitis  
(3) Osteitis deformans  
(4) Sarcoma Ewing

Treat (1) Gutter operation  
↓ (1) Winnett orr

## (B) Brodie's abscess

Def Primarily chronic metaphysial central staphylococcal abscess walled in by dense sclerosis with periodic acute exacerbations



- (5) **Epiphysial changes**
  - (A) Irregular development
  - (B) Osteochondritis
  - (C) Separation : Parrot's pseudoparalysis  
Period Infants with congenital syphilis before the end of first year
- (6) **Craniotabes** Abnormal thinning of skull bones  
Period Congenitally syphilitic children within first 6 months

#### Clinic

#### (1) Bone lesions

##### (A) Congenital Syphilis

- (1) **Osteochondritis of nasal septum**
  - (a) Snuffles
  - (b) Depressed nasal bridge
- (2) **Craniotabes**
- (3) **Parrot's Nodes**
  - (a) Hot cross bun head
  - (b) Natiform head
- (4) **Epiphysitis** Pseudoparalysis of Parrot
- (5) **Dactylitis** Osteoperiostitis of {metacarpals  
metatarsals  
phalanges
- (6) **Sabre Tibia**
  - (a) Anteroposterior curve
  - (b) No buttress in the concavity
  - (c) Whole length affected
- (7) **Teeth**
  - (a) **Hutchinson**  
Notched and pegshaped permanent incisors
  - (b) **Moon**  
Permanent molars

##### (B) Acquired Syphilis

- (1) **Primary** Nil
- (2) **Secondary**
  - (a) Osteocopic pains
  - (b) Periosteal nodes Syphilitic periostitis
- (3) **Tertiary**
  - (a) **Periosteal gumma**  
Firm tender swelling over a bone  
↓ Induration of overlying soft tissues  
↓ Red oedematous skin  
↓ Fluctuation



↓ Bursting gumma  
 ↓ Bone necrosis  
 ↓ Ulcerations, perforations, depressions  
 Sites Tibia Sternum Palate Nose  
           skull clavicle

(b) Endosteal gumma

Boring aching nocturnal pain

↓ Local bone thickening

(c) Diffuse sclerosis

Heavy bone with obliteration of medullary cavity

- (2) Other stigmata of syphilis
- (3) Wassermann or Kahn reaction positive
- (4) Therapeutic test positive

#### (IV) METABOLIC DISEASES OF BONE

##### (A) VITAMINE DEFICIENCY DISEASES

###### (1) RICKETS

Def Disturbance of bone formation resulting in abundant osteoid matrix with defective calcification due to perversion of general metabolism of calcium and phosphorus

- Varieties
- (1) Fetal Osteogenesis imperfecta congenita
  - (2) Infantile Rickets proper
  - (3) Adolescent
    - (a) Recrudescence of infantile rickets
    - (b) Hunger osteodystrophy
  - (4) Adult Osteomalacia

###### (A) Infantile rickets

Etiology Age 6 months to 2 years

- Surroundings
- (a) Lack of sunshine
  - (b) Lack of vitamins (vitamin D)

Path (1) Vitamin D deprivation

- ↓ (2) Failure of phosphorus absorption from intestines
- ↓ (3) Perversion of calcium phosphate metabolism
- ↓ (4) Temporary disturbance of ossifying process

- Morb. anat
- (a) Irregular proliferation of cartilage cells
  - (b) Irregular zone of provisional calcification
  - (c) Irregular proliferation of bone cells
  - (d) Diminished quality and quantity of calcium
- leading to—

- (1) abundant osteoid matrix + defective calcification

↓ Imperfectly calcified immature osteoid tissue

+ (a) Bodyweight  
(b) Posture  
(c) Muscle pull } → deformities

(2) Blood Normal calcium reduced phosphorus

#### Clinic

(1) Respiratory disturbances

(2) Gastrointestinal disturbances

Pot belly enlarged liver dyspepsia

(3) Bone changes

(A) Epiphyseal enlargement (a) Wrist  
(b) Ankle

(B) Deformities

(a) Head (α) Craniotabes  
(β) Persistent Fontanelles  
(γ) Brachycephalus

(b) Teeth (α) Delayed eruption  
(β) Concave edges  
(γ) Deficient enamel  
(δ) Caries

(c) Jaws Faulty bite

(d) Spine (α) Kyphosis  
(β) Scoliosis

(e) Thorax (α) Rickety rosary  
(β) Pigeon breast  
(γ) Harrison's sulcus

(f) Pelvis (α) Flattened  
(β) Oval  
(γ) Triradate

(g) Extremities (1) Coxa vara  
(2) Genu valgum  
(3) Genu varum  
(4) Flat foot  
(5) Bow legs

Rickety bones (A) Curves

(1) Exaggeration of natural curves  
(2) Curves at the insertion of muscles  
(3) Curved weight bearing bones

(B) Buttresses in the concavity

Compl (1) Gastrointestinal  
(2) Respiratory

- (3) Laryngeal spasm
- (4) Convulsions
- (5) Deformities and their sequelæ
- (6) Fractures

**Treat**

- (1) General
  - (A) Correction of faulty diet and hygiene
    - (a) Sunshine & ultra violet rays
    - (b) Milk, eggs, meat juice
  - (B) Medicinal Cod-liver oil  
Calcium  
Vitamin D
- (2) Local Deformities
  - (A) Preventive
    - (a) Non or guarded weight bearing
    - (b) Splints, supports, appliances
  - (B) Curative
    - (1) Operation
      - (a) Manual osteoclasis
      - or (b) Osteotomy (β) linear  
(a) cuneiform
    - ↓ (2) Correction of Deformity
    - (3) Fixation
      - in position of slight over correction
      - by Plaster-of Paris
      - for three to four weeks

**(B) Adolescent Rickets**

**Synonyms** *Feminine osteomalacia*

*Hunger osteodystrophy feminae*

**Path** (1) Recrudescence of infantile rickets

(2) Hunger osteodystrophy feminae

**Clinic** All signs of infantile rickets except epiphyseal changes in adolescents, whose diet lacks in Vitamin D.

**(C) Adult Rickets Osteomalacia :**

**Def** Generalized extreme decalcification of the skeleton with deformities from curvature or fracture in pregnant women, debilitated by inadequate food restricted freedom and prolonged lactation

**Etio** (1) Pregnancy and lactation

(2) Inadequate diet *avitaminosis*  
deficient calcium

(3) Bad hygiene

- Cause** (1) **D avitaminosis**  
 (2) Deficient calcium intake due to  
 (a) Deficient food  
 (b) Deficient absorption
- Path** ↓ (1) **Decalcification of osseous frame work**  
 (2) Fibrocellular metaplasia  
 (3) **Normal blood calcium and phosphorus**
- Clinic** (1) **Pregnancy or Lactation (repeated)**  
 (2) General asthenia  
 (3) **Bone lesions**  
 (A) Deformities (as in rickets)  
 (B) Fractures  
 (C) X Ray Thin compact bone  
 Faint shadows
- Compl** **Difficult parturition**
- Treat** (1) **Calcium**  
 (2) **Vitamin D**  
 (a) Dietetic eggs, milk butter  
 (b) Irradiated ergosterol  
 (3) **Cod liver oil**  
 (4) **Ultra-violet exposures**

(2) **SCURVY**

**Etio** **Age** between 3 and 18 months

**Path** (a) **Vitamins C and D deficiency**  
 ↓ (b) **Hæmorrhages and hæmorrhagic extravasations**

- Clinic** (1) **Mucous membranes Hæmorrhages**  
 (a) External  
 (b) Internal  
 (2) **Subcutaneous Hæmorrhagic extravasations**  
 (3) **Bones** (a) Subperiosteal hæmorrhages  
 (b) Separation of epiphyses  
 (4) **Joints Hæmarthrosis**

**Treat** **Vitamins C and D**

- (1) **Vitamin C**  
 (a) Diet fruit juice cabbage potato  
 cream  
 (β) Medicinal ascorbic acid  
 (2) **Vitamin D**  
 (a) Diet eggs, milk butter  
 (β) Medicinal irradiated ergosterol

(B) **RENAL DEFICIENCY DISEASES:**(1) **RENAL RICKETS OR DWARFISM**

**Etio** Juvenile nephritis

**Path:** Disturbance of Calcium metabolism due to nephritis (Calcium shortage)

**Treat (I) Excision**

- Ind (a) Displaced tendons & muscles  
 (b) Pressure on nerves, vessels, joints  
 (c) *Bursitis*  
 (d) Fracture  
 (e) Cosmetics

**(B) Flat Bones**

- Site Pelvis thorax scapula skull  
 Path (1) **Ossifying** In skull  
 (2) **Non-ossifying chondroma** In pelvis  
 Clinic Hard  $\rightarrow$  fluctuating multilobular or multilocular swelling fixed to the parent bone  
 Sp. Compl (1) Mucoid degeneration  
 (2) Pressure signs  
 (3) Obstructed delivery  
 (4) **Sarcoma**  
 (C) **Short long bones**  
 Age Children  
 Site Central diaphysal in metacarpals and phalanges  
 Path **Non-ossifying enchondroma**  
 Clinic (1) Gradual painless, noninflammatory multiple central expansions of the bones of the hand  
 (2)  $\lambda$  Ray expansion with specks of calcification  
 Diff diag (1) T B. dactylitis  
 (2) Syphilitic dactylitis  
 (3) Osteoarthritis  
 (4) Tendon sheath tumours : ganglion  
 Sp. Compl (1) Pathological fracture  
 Treat (1) Posterolateral incision  $\rightarrow$  curettage  
 (2) Amputation

**Secondary changes in chondromata**

- (1) Calcification  
 (2) **Ossification**  
 (3) **Mucoid degeneration**  
 (4) Necrosis  
 (5) Pathological fracture  
 (6) Malignant—sarcomatous degeneration

**Complications of chondromata**

- (1) **Cosmetic deformities**  
 (2) **Fracture**  
 (3) Friction  
 (4) Pressure  
 (5) *Impairment of function*  
 (6) Secondary change

## Treatment of chondromata

- (1) Incision and curette    Enchondroma
- (2) Excision    Ecchondroma
- (3) Amputation    Multiple enchondromata

## (3) OSTEOMA

## (A) Cancellous    Ossified chondroma

Site    Neighbourhood of long bone metaphysis

- (a) Around the knee    Femur tibia, fibula
- (b) Humerus
- (c) Subungual

Path    Ossified metaphyseal ecchondroma

Morb anat

- (1) Adventitious bursa
  - (2) Cartilage cap
  - (3) Compact bone
  - (4) Cancellous bone
  - (5) Bone marrow
- } continuous with parent bone

Clinic (1) Bony out-growth at the side of the end of a long bone

(2) Appearance of one of the complications

Compl

- (1) Fracture
- (2) Bursitis
- (3) Pressure
- (4) Inconvenience

Treat    Excision    After the joining of the epiphysis

## (B) Compact or Ivory

Sites    Bones developed from membranes

(a) Skull    Parietal and Frontal

(a) Outer

(β) Inner

(γ) Air sinuses

(b) External auditory meatus

(c) Jaws

Path    Flat unpedunculated eburnated osteomas

Clinic    Irregular sessile hard bony tumours

Compl    Pressure signs

Diff Diag

- (1) Periosteal node
  - (2) Ossifying sarcoma
  - (3) Quiet necrosis
  - (4) Odontome
  - (5) Leontiasis ossea
  - (6) Deep soft tissue growths and cysts
- Fibromata  
Lipomata  
Cysts

#### (4) DIAPHYSIAL ACLASIS DYSCHONDROPLASIA

Synonyms Multiple exostoses or osteochondromata

Etiol: (a) Hereditary and familial

(b) Childhood

(c) Boys

Path Theories (1) Keith

(a) Disturbance of endochondral ossification

↓ (b) Failure of bone modelling

(2) Jansen

(a) Failure of limiting action of periosteum at the metaphysis

↓ (b) Failure of tubulation

Morb anat (1) Multiple irregular outgrowths of cartilage and bone

(2) Failure of bone modelling at the metaphysis

(3) Deficient growth in the length of bones

Clinic (1) Multiple irregular exostoses at the metaphysis of long bones

(2) Dwarfism

(3) Deformities

(4) X Rays irregular bone modelling

(5) History of heredity or familial occurrence

Treat Leave alone

#### (5) GIANT-CELLED TUMOUR OSTEOCLASTOMA

Etiol Sex either

Age 15-30 years (after the union of epiphyses)

Site (1) Lower extremity

(a) Upper end of the Tibia

(b) Lower end of the femur

(c) Upper end of the fibula

(d) Patella

(2) Upper extremity

(a) Upper end of the humerus

(b) Lower end of the radius

(3) Mandible myelomatous opulis

Isth Origin cancellous bone near metaphysis (affects only bones developed in cartilage)

Morb anat (1) Giant cells (osteoclasts)

+ (2) Spindle cells

+ (3) Vascularity

Honey-comb structure with maroon colour

- Clinic (1) Abrupt, painless, concentric enlargement of a bone end with  
 (a) Signs of increased vascularity  
 (b) Eggshell crackling  
 (2) X Rays Stippled or honey-comb or multilocular appearance with thinning of the compact bone (soap bubble appearance) and a rock bottom edge
- Diff. diag (1) Osteomyelitis  
 (2) Osteoma  
 (3) Osteitis fibrosa  
 (4) Arthritis  
 (5) Aneurysm  
 (6) Sarcoma
- (A) Bone lesions  
 (B) Joint lesions  
 (C) Vascular lesions  
 (D) New growths
- Compl (1) Big size  
 (2) Pathological fracture (in 14%)
- Treat (1) Exposure → curettage → carbolization with pure phenol or 40%  $ZnCl_2$   
 (2) Wide excision with or without bone-graft  
 (3) Amputation  
 (4) Deep X Rays
- After-treat Deep X Rays
- (6) DIFFUSE OR MULTIPLE MYELOMATOSIS KAHLER'S DISEASE
- Eti Age 40-60 years  
 Sex Males  
 Sites Skull sternum ribs vertebrae femur
- Path New growth of plasma cells of blood-forming marrow
- Clinic (1) Multiple painful bone tumours  
 or (2) Pathological fracture  
 (3) Enlarged spleen and liver (malignant metastases)  
 (4) Bence Jones albumosuria  
 (5) Blood increase in calcium and phosphorus  
 (6) X Rays clear punched out area in the bone
- Compl (1) Pathological fracture  
 (2) Pressure signs cerebral  
 (3) Malignancy
- Treat Deep X Ray therapy  
 (7) PLASMOCYTOMA  
 (A) Single
- Sites Long bones humerus femur
- Path Mass of plasma cells



Clinic (1) **Pathological fracture**  
 (2) X Ray destruction + expansion + clear area

Diag (1) No multiplicity  
 (2) No Bence-Jones albumose

Treat Excision and bone-graft  
 (B) Multiple

Clinic (1) Multiple growths in bone  
 (2) No Bence-Jones albumose

(B) **FIBROMA**

- (1) *Fibrous epulis*
- (2) *Fibrous odontome*
- (3) **Periosteal fibroma**
- (4) **Parosteal fibroma**
- (5) **Fibrosarcoma (malignant)**

(9) **SUB-PERIOSTEAL LIPOMA**

**(B) MALIGNANT GROWTHS:**

(1) **SARCOMA**

Etio Frequency **30% of all sarcomas**

Age **Second decade**

Sex **males**

Site **Growing metaphysis of long bones**

(a) **Lower end of the femur**

(b) **Upper end of the tibia**

Predisposer (1) **Trauma fracture**  
 (2) **Bone disease osteitis deformans**  
 (3) **Innocent tumours chondroma myeloma**

Pathology

Varieties (A) **Origin**

(1) **Periosteal** (a) **Spindle celled**  
 (b) **Round celled**

(2) **Endosteal** (a) **Spindle celled**  
 (b) **Round celled**

(3) **Parosteal** **Fibrosarcoma from the outer layer of periosteum or aponeuroses**

(4) **Ewing's Endothelioma**

(5) **Secondary** **To benign growths Chondroma**

(B) **Cells**

(1) **Round celled**

(2) **Spindle celled**

(3) **Mixed celled**

(4) **Giant celled**

**(C) Matrix**(1) **Telangiectatic or angio-sarcoma**(2) **Chondrosarcoma**

(a) Primary

(b) Secondary (to chondroma)

(3) **Osteosarcoma**

(a) Irregularly scattered

(b) Radiating

(c) Periosteal lifting

(4) **Fibrosarcoma**(5) **Myxosarcoma**

- Origin**
- (1) **Periosteum** Periosteal
  - (2) **Bone marrow** Endosteal malignant myeloma
  - (3) **Parosteal** Outer layer of periosteum
- Spread**
- (1) **Endosteal** up and down the marrow
  - (2) **Sub-periosteal** around the bone
  - (3) **Extra periosteal** in the soft tissues

**Secondaries** Blood lungs**Clinic****(A) Local**(1) **Painful type** Localized persistent bony pain(2) **Vascular tumour type****(A) Shape**

(a) Gradual sprudleshaped endosteal

(b) Abrupt encircling periosteal

(c) Discrete but adherent parosteal

**(B) Consistency**(1) **Hard** osteosarcoma

chondrosarcoma

(2) **Fleshy** fibrosarcoma(3) **Soft** myxosarcoma(3) **Fracture type** Pathological non-union(1) **Early** endosteal(2) **Late** periosteal(4) **Periostitis or osteomyelitis type**

Ewing's tumour

(5) **Metastatic type**(a) **Lung symptoms**(b) **X Ray** Cannon ball shadows(6) **X Ray type** Local sarcomatous picture in an unsuspected case

## (B) General

- (1) Cachexia
- (2) Fever
- (3) Anaemia

## (C) Referred due to secondaries or pressure

- (1) Lung signs
- (2) Pressure signs

## Signs (1) X Ray

- (a) Osteoclastic Bony erosion without new formation
- (b) Osteoplastic Irregular osseous mass
- (c) Spiculation Ladder pattern

## (2) Radiation

- (a) Therapeutic effect Ewing
- (b) Increased bone deposition in sarcoma

## (3) Biopsy

## Diff. Diag (A) Bone affections

- (1) Trauma callus, periosteal haemorrhage
- (2) Inflammation periostitis  
osteomyelitis
- (3) Specific diseases T B  
syphilis
- (4) Tumours & cysts

## (B) Joint affections Chronic arthritis

(C) Muscle affections Myosarcoma  
Gumma  
Myositis ossificans

## (D) Vessel affections Aneurysm

*Special features of different varieties*

## (1) Periosteal

- (A) Tumour type Puberty  
Rapid growth  
Vascularity  
Abrupt encircling swelling

## ↓ (B) Fracture type Late

## (2) Endosteal

- (A) Painful type Localized persistent pain  
early

## ↓ (B) Fracture type: Pathological fracture early

or (C) Tumour type Small spindleshaped central  
swelling late

- (3) Parosteal Tumour type: Irregular submuscular  
hard mass secondarily  
adherent to bone  
No bone erosion

**(4) Ewing Inflammatory type**Etiology Age **5-15 years**Sex **Male**Site (a) **Middle of the shaft of long bones**

Tibia femur humerus

(b) **Short bones**Path Origin **Bone marrow of mid part of diaphysis**Morb. anat **Picture of osteomyelitis**Microscope **Embryonic round cells****with****No intercellular matrix**Clinic (1) **History of recent trauma**(2) **Pain**(3) **Pseudo inflammatory signs**(a) **Local osteomyelitic or periostitic**(b) **General pyrexia with leucocytosis**(4) **Metastases bones lymph glands viscera**(5) X Ray (a) **Endosteal destruction****Mottling of marrow**(b) **Subperiosteal ossification****Widening and sclerosis of compact bone**Diff diag (1) **Chronic periostitis or osteomyelitis**(2) **Syphilitic or tuberculous osteomyelitis**(3) **Multiple myelomata**(4) **Bone secondaries**Diagnosis **Therapeutic effect of deep X Ray therapy**Treat **Deep X Rays**(5) **Telangiectatic Sarcoma**(A) **Vascular tumour type**(B) **Aneurysmal type**} **Pulsations and vascularity**(6) **Chondrosarcoma**Etiology Sites **Costal cartilages****Ends of long bones**Clinic (a) **Recurrence after removal**(b) **Rapid growth**(c) **Local infiltration**(7) **Osteosarcoma**Clinic (a) **Hard bony tumour**(b) X Ray **Radiating spiculation****Treatment of bone sarcomata**(1) **Amputation Above the proximal joint****Ind Sarcoma of main bone of a limb**

- (2) **Local Excision** With bone-graft
  - Ind (a) Adult age
  - (b) Long history
  - (c) Post traumatic
  - (d) Useful limb after excision
- (3) **Deep X Ray therapy**
  - Ind (1) Ewing's tumour
  - (2) Post-operative
  - (3) Early cases
- (4) **Coley's fluid** B. Prodigiosus + Streptoc. erymelatis half a minim intramuscular every day in gradually increasing doses
- (5) **Radium**

**Prognosis** : Recurrence in viscera within a year to three years

## (2) SECONDARY CARCINOMA

**Methods of Extension**

### (A) Local Extension

- (a) Rodent ulcer
- (b) Lupus carcinoma
- (c) Skin or mucous membrane carcinoma

### (B) Lymphatic extension (Sampson Handley)

- (a) Permeation
- (b) Embolism

### (C) Blood extension (Piney)

*Primaries which metastasize in bones*

The possibility of a carcinoma metastasizing in bones depends on the nature of the cell and the rate of growth therefore on the degree of malignancy. As a rule,

- (i) a rodent ulcer does not metastasize
- (ii) a squamous-cell carcinoma metastasizes in the regional lymphatic nodes
- (in) a columnar-cell carcinoma metastasizes in the regional lymphatic nodes, liver and lungs
- and (iv) a spheroidal-cell carcinoma metastasizes in the regional lymphatic nodes, liver lungs and bones

### (1) Breast

- Site (a) Local deposits  
Vertebrae, ribs, sternum femur and humerus
- (b) Generalized cancerous osteomalacia

(2) **Thyroid**

Site Skull vertebrae, sternum

Clinic (a) Very vascular

(b) Capable of function

No myxoedema on total thyroidectomy

(3) **Hypernephroma**

Site femur sternum pelvis

(4) **Prostate**

Site Pelvis spine skull

Varieties (a) Osteoplastic

(b) Osteoclastic

(5) **Bronchus**

(6) Suprarenals and testes

(7) Stomach intestines rectum

(8) Bladder and uterus

(9) Tongue and oesophagus

(10) Melanoma malignum

Morb. anat Decalcification + destruction without new formation (except in prostate)

Clinic (A) **Local**(1) **Painful type** Pain + tenderness(2) **Tumour type** Vascular swelling (thyroid)(3) **Fracture type** (Union occurs)(4) **Deformity type** Angular curvature in old age(5) **X Ray type** Irregular bone destruction with no reaction(B) **General**

(1) Old age

(2) Cachexia

(C) **Referred**

Primary growth present

Treatment (1) **Deep X Ray therapy**

(2) Radium

(3) Radical operation for the primary is contraindicated though palliative measures may be carried out

**(VIII) OPERATIONS ON THE BONES**

Indications: (1) Trauma  
 (2) Infections  
 (3) New growths  
 (4) Deformities

## EXPOSURES OF VARIOUS BONES

## (1) Humerus

- (A) Upper ext: (a) Line of cephalic vein  
 ↓ (b) Deltoid split
- (B) Mid portion: (a) Deltoid insert on to ext. condyle  
 ↓ (b) Brachialis split
- (C) Lower ext: Posterior incision  
 ↓ Triceps split  
 (a) Division into superficial and deep portions  
 (b) Leave superficial portion attached to olecranon  
 (c) Leave deep portion attached to humerus

Save (1) Radial nerve

(2) Ulnar nerve

## (2) Radius

- (A) Head and neck  
 (a) Incision vertical from ext. condylar tip  
 ↓ (b) Common extensor split
- (B) Upper third:  
 (a) Incision ext. epicondyle to ulna  
 (b) Common extensor split  
 (c) Supinator displacement
- (C) Lower two-thirds  
 (a) Incision along the medial border of brachio-radialis

Save (1) Radial nerve

(2) Radial artery

## (3) Ulna

- (A) Coronoid  
 (a) Incision anterior  
 (b) Brachialis split
- (B) Shaft Incision along the posterior border

## (4) Femur

- (A) Upper part:  
 (1) Anterior route  
 (a) Incision anterior third of iliac crest  
 ↓ down along the sartorius  
 ↓ (b) Separation of muscle origins
- (2) Lateral route  
 (a) Goblet incision  
 ↓ (b) Trochanter cut
- (3) Posterior route  
 (a) Incision parallel to gluteus max. ending beyond the trochanter  
 ↓ (b) Gluteus maximus split



### U (B) Femoral Shaft

- (a) Incision: in the line of  
 (a) Anterior superior iliac spine,  
 to (3) Outer border of patella

↓ (b) Quadriceps split between

(a) Vastus externus

and (2) Vastus intermedius

- (5) Tibia } Incisions parallel to and behind the subcutaneous borders  
 (6) Fibula }

Save External popliteal nerve (upper part of fibula)

(7) Patella (a) Incisions

(1) Vertical anterior midline

(2) Curved (a) convex down

(4) convex up

## (2) OPERATIONS FOR FRACTURES

### Indications

#### (A) Local

- (1) Compound fracture  
 ( ) Complicated fracture  
 (3) Persistent deformity In spite of efficient skeletal traction  
 (4) Separation of small processes  
 (5) Separation of epiphysis

#### (B) General

- (1) Adult age  
 (2) Active occupation  
 (3) Weight bearing bones  
 (4) Reliable asepsis and technique

### Common Sites

- (1) Skull (a) Compound fracture  
 (b) Local depressed fracture  
 ( ) Gradual brain compression  
 (2) Face Persistent deformity  
 (3) Humerus (a) Persistent gross displacement  
 (b) Separation of bony processes  
 (4) Both forearm bones: at one level  
 (5) Femur (a) Neck  
 (b) Separated condyles or trochanters  
 (c) Shaft with persistent deformity  
 (6) Patella  
 (7) Olecranon  
 (9) Unreduced Pott's fracture

### Contraind

- (1) Age (a) below 15 (b) above 40  
 (2) Bad general health and constitutional disease  
 (3) Communion and sepsis

Operative Procedures (Also see under respective bone affections)



## (1) EXPOSURES OF VARIOUS BONES

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(2) Curved (a) convex down  
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## (2) OPERATIONS FOR FRACTURES

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(6) Patella  
(7) Olecranon  
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### Contraind

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 (6) Patella  
 (7) Olecranon  
 (9) Unreduced Pott's fracture

### Contraind

- (1) Age (a) below 15 (b) above 40  
 (2) Bad general health and constitutional disease  
 (3) Communion and sepsis

Operative Procedures (Also see under respective bone affections)

## (A) OPERATIONS FOR RECENT FRACTURES

## (1) Transfixion

Ind (1) Skeletal traction

(A) Direct mobile weight traction

(B) Plaster incorporation traction

(2) Fixation of reduced fracture

(A) Fractures of long bones femur tibia fibula humerus

with (a) Persistent displacement

(b) Comminution

(c) Sepals

(B) Deformity } of big joints (hip)  
Dislocation  
Arthritis

Methods (1) Traction Pin Steinmann

(2) Traction Wire Kirschner

(3) Traction Callipers

(4) Traction Tongue

Sites

(1) Femur Indication Fracture shaft

Site Two fingers breadth above the most prominent part of condyles

Contri (a) Stiff knee

(b) Sepals bone or joint

(2) Tibia:

(A) Upper end Indication (a) Fracture femur

(b) Fracture femur with  
sepals(c) Fracture lower end of the  
femur

Site Three-fourth inch below and behind the tibial tubercle

(B) Lower end Ind Fractures tibia and fibula  
with (a) Displacement

(b) Comminution

(c) Sepals

Sites: (1) Three inches above the ankle

(2) Through the malleoli

(3) Upper and lower combined:

Ind: Fractures both the bones of the leg  
Plaster incorporation method

(3) Os calcis: Ind (a) Fracture through ankle joint

(b) Fractures lower end of tibia and  
fibulaSites (1) One finger breadth below and behind the tip  
of external malleolus(2) Above the posterior process of os calcis in  
front of tendo achillis

- 1 (4) **Olecranon:** Ind Fracture lower end of the humerus  
with (a) Displacement  
(b) Comminution  
(c) Sepsis
- After-treat (1) Weight extension  
or (2) Incorporation in Plaster-of-Paris
- Complications (1) Overtraction  $\rightarrow$  non-union  
(2) Undertraction  $\rightarrow$  persistent deformity  
(3) Injury to: joints, vessels, tendons  
(4) Infection (a) Bone  
(b) Joint  
(c) Skin  
(5) Cutting out of the pin  
(6) Skin sores
- (2) **Coaptation with or without impaction**  
Ind (1) Fracture at the junction of shaft with extremity  
Surgical neck of humerus  
(2) Fracture radius
- Tech (1) Exposure of the fragments  
(2) Removal of intervening callus and soft tissues  
(3) Preparation of the ends  
(4) Coaptation with or without impaction  
(5) Soft tissue sutures
- After-treat Plaster-of-Paris
- (3) **Plating with (a) Screws  
(b) Bolts**
- (A) With screws:
- Ind (1) Transverse fractures of the long bone shafts  
Femur tibia radius  
(2) Y Fractures into the joints  
Elbow knee
- Contraind (1) Children  
(2) Sepsis  
(3) Oblique fractures
- Tech (1) Incision  $\frac{1}{2}$ th of the length of the bone  
(2) Exposure of the fragments  
(3) Manipulative coaptation of the fragments  
(4) Fixation of the fragments by bone forceps  
(5) Application of the plate subperiosteal  
(6) Screws three on each side
- (1) Femur After-treat Thomas splint  
Massage and movements after two weeks  
Weight bearing after twelve weeks
- (2) Humerus After position moderate flexion of the elbow
- (3) Forearm bones Plate the radius only  
Fixation in mid position

(D) Catgut chromic

(E) Fascia Lata

**Sites**

(A) Olecranon:

**Ind** Recent fracture with separation**Tech** (1) Incision U

(2) Exposure and toilet of the fragments

(3) Drilling the fragments

(4) Wirelooping

(5) Setting the fracture and tightening the loop

(6) Suture of the triceps aponeurosis

**After-treat** (1) Sling with flexion of the elbow for 4 weeks

(2) Movements from the 3rd day

(3) Use of hand from the 3rd week

(B) Patella

**Methods**

(1) Wiring

(2) Suture

(a) Kangaroo tendon

(b) Silk

(c) Chromic catgut

(d) Fascia

**Ind** Transcapsular avulsion fracture with separation**Time** Within the first week**Tech** (1) Incision U or  $\Omega$ (2) Exposure and toilet (a) Fracture  
(b) Joint(3) Drilling (a) Anteroposterior  
or (b) Side to side

(4) Setting the fracture

(5) Passing the wire or suture (a) Anteroposterior  
or (b) Side to side

(6) Suture of the aponeurosis

**After-treat of** (A) Wiring Flexion over a pillow  
Movements from 4th day  
Weight bearing from 3rd week

(B) Suture Plaster-of Paris fixation for six weeks

(3) Fascial encirclement

**Tech** (1) External J incision

(2) Fascia lata strip with lower attachment intact

(3) Encirclement

through quadriceps tendons

↓ inner side

↓ through ligamentum patellae

↓ head of the fibula (lower attachment)

**Advantages** (1) Living suture

(2) New insertion for quadriceps

**(B) OPERATIONS FOR MALUNION****(A) ANGULAR DEFORMITY:****(1) Simple osteotomy**

Def Division at the site of deformity and readjustment in alignment  
 Ind Upper end of the femur

- Tech (1) Incision local one inch  
 (2) Exposure of the bone  
 (3) Elevation of periosteum  
 (4) Osteotomy for two-thirds of the bone thickness  
 (5) Manual osteoclasis  
 (6) Readjustment  
 (7) Closure

After-treat (A) Femur (a) Plaster of Paris for 6 weeks  
 (b) Walking calliper for 6 months  
 (B) Tibia (a) Plaster of Paris for 4 weeks  
 (b) Plaster with side iron for 4 months

**(2) Cuneiform osteotomy**

Def Removal of a wedge from the convexity and readjustment of alignment

Ind Tibia after Pott's fracture

Tech Angle of the wedge must be equal to angle of the convexity

**(3) Curved osteotomy Supracondylar**

Ind Flexion deformity of the knee

- Tech (1) Lateral supracondylar incisions  
 (a) inner  
 (b) outer  
 (2) Curved saw cut three inches above the knee  
 (a) anteroposterior  
 (b) convexity downwards  
 (3) Adjustment of alignment  
 (4) Plaster fixation  
 (4) Bifurcation osteotomy (See under nonunited fracture femoral neck)

Ind (1) Adduction deformity of the hip coxa vara  
 (2) Ununited fracture of the femoral neck

- Tech (1) Supra-trochanteric (minor) osteotomy  
 (2) Inward displacement of the shaft  
 (3) Abduction (to umbilicus) } of the thigh  
 + Impaction (to pelvis) }  
 (4) Plaster of Paris fixation for 3 months

**(B) SHORTENING: OVERLAPPING**

- (1) Recent: (a) Refracture  
 ↓ (1) Skeletal traction  
 (2) Intermediate (a) Exposure  
 ↓ (1) Resetting  
 ↓ (c) Fixation



- (C) : Late : (a) : Osteotomy  
 ↓ (b) Traction  
 ↓ (c) Bone wedges  
 ↓ (d) Fixation

### (C) OPERATIONS FOR NON UNION

(1) Multiple drillings : For delayed union

(2) Freshening the fragments And

(a) Coaptation

(b) Impaction

(c) Stepcut fixation

Ind Humerus

Both forearm bones

(d) Double-cone

Mutual adjustment of the shape of the fragment ends

(3) Bone-graft

Methods (A) Massive Grafts

(1) Onlay

(2) Inlay Diamond simple sliding double

(3) Intramedullary Simple cricket-ball double

(4) Terminal

(B) Small graft

(1) Bone nails

(2) Bone chips

(3) Matti method

(C) Mixed grafts

Ind (1) Ununited fracture

(a) With no loss of bone

(b) With loss of bone

(2) Loss of bone : Due to

(a) Trauma

(b) Osteomyelitis

(c) Excision

(3) Stabilization of joints Arthrodesis

### Functions of the graft

(1) Strut formation

(2) Osteoconductive

(3) Osteoformative

Sources (1) Hetero : (a) Ivory

(b) Beef

(c) Antler

(2) Homo (Same blood group)

(3) Auto (1) Living

(2) Boiled

- Sites:** (1) Shaft of the tibia for spine, hip  
 (2) Shaft of the fibula for humerus or femur  
 (3) Ribs  
 (4) Pelvic crest for jaw  
 (5) Free fractured fragment
- Preliminaries**  
 (a) Good general health  
 (b) Three months after healing  
 (c) Treatment of marked deformity
- Stage I: Host bone**  
 (1) Exposure  
 (2) Excision of scar tissue or callus  
 (3) Freshening of the bone ends  
 (4) Preparation of graft bed
- Stage II: Bone-graft:**  
 (A) Massive graft  
**Tech** (1) Incision  
 (2) Separation of soft tissues  
 (3) Division of periosteum  
 (4) Separation of graft from any suitable site  
 (5) Placing the graft on bed  
 (6) Fixation catgut kangaroo wire  
 (7) Suture of soft tissues
- After-treat** Plaster fixation for 3 months
- Methods of massive grafts**  
 (1) **Onlay** Laying and fixing the graft over the surface of the host bone  
 (2) **Inlay** Laying and fixing the graft in a bed cut on the surface of the host bone  
 (a) **Cortical inlay**  
**Ind** Non-union without gap  
**Tech** (1) Preparation of bed for graft  
 (2) Separation of the graft  
 (3) Placing the graft in the bed  
 (4) Fixation of the graft  
 (b) **Sliding inlay:** Grafts out of the surfaces of the fragments long one bridging the fracture  
 (c) **Double inlay:**  
**Ind** Gap fracture or non-union of femur  
**Tech** (1) Freshening the fragment ends and contact  
 (2) Bed on either side  
 (3) Two grafts from tibia  
 (4) Placing the grafts in beds  
 (5) Fixation with bolts
- (3) **Intramedullary:**  
 (a) **Simple**  
**Ind** (1) Transverse fracture of long bone: femur humerus, radius  
 (2) Gap fractures of long bones

- Tech (1) Exposure and freshening the ends  
 (2) Drilling the medullary cavity of fragments  
 (3) Cutting the graft  
 (4) Insertion of the graft in the medullary cavity

(b) Cricket ball;

Ind Gap fractures of tubular bones radius

- Tech (1) Graft  $4'' \times \frac{3}{4}'' \times \frac{1}{2}''$  with two ends sharp  
 (2) Isolation and freshening of two fragments  
 (3) Splitting the end of one fragment  
 (4) Put the graft first in unsplit end and then in the split end

After-treat Fixation

in Elbow flexed

Forearm supinated

Wrist dorsiflexed

by Plaster of Paris

(c) Double or two piece;

Ind Gap in the shaft of long bones humerus

- Tech (1) Two flat grafts with peg handles  
 (2) Pegs in respective fragments  
 (3) Grafts wired together

After-treat (1) Abduction splint

↓ (2) Abduction plaster

(4) Terminal;

Ind Replacement of articular end of a long bone

(A) Humeral head

(B) Radial lower end

(C) Femoral head and neck

Tech (1) Preparation of the bed.

Excision of host extremity

(2) Preparation of the graft

Excision of the head & upper shaft of fibula

Tech (a) Incision

(b) Exposure and separation of fibular head and neck

(c) Fixation of biceps and lateral ligament to tibia

Save Ext. popliteal nerve

(3) Drive the graft into the host shaft

(B) Small Grafts

(5) Bone Nails

Ind (1) Ununited fracture near an extremity of a long bone

(2) Separation of processes, trochanters, tubercles

(A) Humerus (a) Neck

(b) Lower end

(B) Ulna upper end

(C) Femur (a) Neck

(b) Subtrochanteric

(D) Os calcis posterior process

- Tech (1) Peg shaped graft  
 (2) Drilling both the fragments after reduction  
 (3) Driving in the bone peg  
 (4) Bone Chips:  
 Ind (1) Nonunion without gap  
 (2) Availability of chips on the spot  
 Tech: (1) Exposure  
 (2) Excision of callus and separated comminuted fragments  
 (3) Guttering of both the fragments  
 (4) Apposition of the fragments  
 (5) Filling in the cavity with bone chips  
     from (a) freshened guttered fragments  
         (b) callus  
         (c) iliac crest or rib

After-treat Splint for 10 days → plaster cast

(7) Matti Method

As in (6)

Semifluid medullary material from greater trochanter to be used in addition to bone chips

(C) Mixed Grafts

Mixture of any two or more of the above methods

Inlay combined with intramedullary

Ind Gap fractures below surgical neck of humerus

- Tech (1) Exposure and excision of callus or scar  
 (2) Preparation of bed  
     (a) Drill the upper fragment marrow  
     (b) Cortical bed in lower fragment  
 (3) Graft from tibia  
     (a) Round upper half  
     (b) Flat lower half  
 (4) Placing the graft  
     (a) Pegging the upper fragment  
     (b) Inlay graft in lower fragment  
 (5) Fixation by wire loop lower inlay graft

After-treat (1) Internal angular splint for 10 days

- ↓ (2) Fixation  
     in Shoulder abducted  
         Elbow flexed  
         Wrist dorsiflexed  
         Hand: to the chin

by: Plaster-of-Paris

Complications of bone graft

- (1) Graft falling on the floor (a) Reject  
     (b) Boil

(2) Sepsis

After-treatment of bone graft

- (1) Splint immobilization for 10 days sutures out

↓ (2) Plaster-of-Paris immobilization

Till union is complete

## (3) OPERATIONS FOR OSTEOMYELITIS

## (A) ACUTE OSTEOMYELITIS:

## (1) Periosteal drainage

- Ind (1) Septicæmic stage  
(2) Sub-periosteal accumulation

- Tech (a) Tourniquet  
(b) Incision  
    (α) Femur outer side  
    (β) Tibia inner side along posterior border  
    (γ) Humerus through the deltoid  
    (δ) If abscess along the abscess  
(c) Exposure of the bone  
(d) Periosteal incision  
(e) Drainage of sub-periosteal pus

- ↓ (2) Starr's operation (A) Periosteal incision  
                                    + (B) Multiple drilling or trephining

- Ind (a) No sub-periosteal pus  
(b) Non-amelioration of signs within 24 hours of periosteal drainage

- Tech (1) As in periosteal drainage  
(2) Multiple drills or trephinations into the bone marrow  
(3) Drainage upto the bone

## ↓ (3) Metaphysial drainage Saucerization

- Ind Thick pus welling out of trephine hole

- Tech (1) As in periosteal drainage  
(2) Saucer-shaped bone gouging 1.5 x 7.5  
(3) Antisepsis  
    (a) Rectified spirit lavage  
    (b) Acriflavine lavage  
    (c) Flavine-Paraffin-Vaseline pack

- After-treat (A)  
    (1) Elastoplast or adhesive extension  
        On a Thomas's splint  
    (2) Removal of pack on the 7th day under general anaesthesia  
    (3) Subsequent dressings at 5 days intervals  
or (B) Plaster-of-Paris fixation  
    extent: Joint above and below  
    for: 6-8 weeks

## (B) SUBACUTE OR CHRONIC OSTEOMYELITIS

## (4) Diaphysial drainage: Gutter operation

Def: Sub-periosteal removal of compact tissue of half or more of the circumference over the infected area

- Ind (1) Medullary osteomyelitis  
 (2) Metaphysal  $\rightarrow$  medullary osteomyelitis  
 (3) Subacute or chronic osteomyelitis
- Tech (1) As in saucerization  
 (2) Removal of half to one-third of the circumference by chisel  
 (3) Gentle scraping of the bone marrow  
 (4) Antiseptic applications as in saucerization

After treat Winnett orr

- (5) Sub-periosteal resection of the diaphysis  
 (A) Total  
 (B) Partial

- Ind (1) Separation of whole shaft  
 (2) Subacute or chronic stage  
 (3) Non important bone clavicle, ulna, fibula

- Tech (1) As in periosteal incision  
 (2) Cut the shaft midway  
 (3) Twist off each half  
 (4) Antiseptic applications  
 (5) Drain

After treat Winnett orr

- (6) Sequestrotomy

Def Removal of the dead separated piece of bone by cutting through the ensheathing involucrum

- Time (1) Two months after acute stage  
 (2) Thin parchment like involucrum :  
     needle prick test  
 (3) Mobile sequestrum Probing-  
 (4) X-Ray Separated sequestrum

- Tech (1) Incision including the sinuses  
 (2) Separation of soft tissues  
 (3) Elevation of periosteum  
 (4) Enlargement of cloacæ  
 (5) Removal of sequestrum  
 (6) Sterile vaseline pack

After-treat Winnett orr

- (7) Secondary operations for persistent cavity  
 after (a) Sequestrotomy  
       (b) Gutter operation  
       (c) Diaphysectomy

- (1) Muscle pedicle flap  
 (2) Bone-grafting (1) Massive  
                     (2) Chips  
                     (3) Matti

## IMPORTANT POINTS

- (1) Metaphysis is the most important part in pathology of bone next is the periosteum.
- (2) In all cases of metabolic diseases of bones leading to deficient calcium, the X Ray shadows are very hazy and may give an impression of badly developed film as in (a) Rickets  
(b) Osteomalacia.
- (3) Fractures with special names (See under respective bones)
  - (a) Colles Lower end of the radius—Dinner fork deformity
  - (b) Smith's Lower end of the radius [Reverse of (a)]
  - (c) Chauffeur's Lower end of the radius
  - (d) Bennett's Base of the first metacarpal
  - (e) Pouch Shaft of the second metacarpal
  - (f) Kocher's Pertrochanteric femoral
  - (g) Pott's Round about ankle
  - (h) Dupuytren's Round about ankle
  - (i) Wagstaffe Round about ankle
  - (j) March Second or third metatarsal necks

- (4) Average periods of disabilities in fractures

<i>Bone</i>	<i>Light work</i>	<i>Heavy work</i>
Clavicle	5 weeks	8 weeks
Humerus	15 weeks	24 weeks
Colles	6 weeks	12 weeks
Femur	30 weeks	40 weeks
Tibia	18 weeks	22 weeks
Both leg bones	20 weeks	30 weeks
Pott's	10 weeks	30 weeks

- (5) Special complications of special fractures

- (1) Skull Intracranial complications
- (2) Face (a) Sepsis  
(b) Deformities
- (3) Spine (1) Paralysis: (a) Muscular  
(b) Urinary  
(c) Intestinal  
(d) Respiratory  
(2) Trophic changes  
(3) Secondary sepsis
- (4) Round about shoulder joint
  - (1) Injury to vessels and nerves
  - (2) Adhesions
  - (3) Osteoarthritis
  - (4) Mal-union

- (5) Middle of the humerus
  - (1) Radial palsy
  - (2) Non union
- (6) Round about elbow
  - (1) Nerve injuries ulnar & radial
  - (2) Vessel injuries : gangrene
  - (3) Muscle affections
    - (a) Volkmann
    - (b) Myositis ossificans
  - (4) Joint ankylosis
  - (5) Deformities cubitus varus or valgus
- (7) Both bones forearm cross union
- (8) Round about wrist
  - (1) Weak wrist
  - (2) Overlooked fracture navicular
  - (3) Deformity
  - (4) Adhesions and ankylosis
  - (5) Osteoarthritis
  - (6) Tenosynovitis
  - (7) Rupture extensor pollicis longus
- (9) Pelvis visceral trauma urethra  
bladder  
rectum
- (10) Femur
  - (1) Mal-union
    - (a) Cox vara
    - (b) Shortening
  - (2) Hip joint
    - (a) Ankylosis
    - (b) Osteoarthritis
  - (3) Knee joint osteoarthritis
- (11) Round about knee
  - (1) Ankylosis knee
  - (2) Osteoarthritis knee
  - (3) Popliteal aneurysm
  - (4) Deformity
- (12) Neck of the fibula  
Paralysis common peroneal nerve
- (13) Round about ankle
  - (1) Deformities Flat foot  
Varus  
Valgus
  - (2) Osteoarthritis ankle
- (14) Metatarsals
  - (1) Flat foot
  - (2) Metatarsalgia
- (15) Bony processes and sesamoid bones
  - (1) Non union
  - (2) Callus formations
  - (3) Myositis ossificans



- (16) Near-about joints (1) Adhesions ( )  
(2) Osteoarthritis ( )
- (6) If there is a localized bone tenderness after a trauma, fracture must be assumed until disproved by X Ray ( )
- (7) In every case of fracture, diagnosis is not complete till examination for the injurer to neighbouring soft parts is completely done (a) vessels (b) nerves; (c) tendons (d) joints (e) viscera; (f) special structures.
- (8) No attempt should be made to reduce a fracture displacement, until good X Ray films or X Ray screen are available.
- (9) It is better to have no X Ray at all than to rely on one film.
- (10) If a radiograph fails to show any evidence of fracture, which is strongly suspected on clinical grounds, the X Ray examination should be repeated after two or three weeks when a crack is exaggerated due to traumatic hyperæmic decalcification.
- (11) Differential diagnosis between
- (A) Dislocation shoulder: from Fracture humeral neck
- |                                   |                                |
|-----------------------------------|--------------------------------|
| (1) Hollow under acromion         | (1) Full shoulder              |
| (2) Head in abnormal situation    | (2) Head normally situated     |
| (3) Head moves with shaft         | (3) Head independent of shaft  |
| (4) Arm cannot be placed on chest | (4) Arm can be placed on chest |
- (B) Dislocation elbow from supracondylar fracture
- |                                  |                           |
|----------------------------------|---------------------------|
| (1) Abnormal bony relations      | (1) Normal bony relations |
| (2) Mobility less due to locking | (2) Mobility more         |
- (C) Sprained wrist from Colles fracture
- |                        |                                 |
|------------------------|---------------------------------|
| (1) No deformity       | (1) Elevation of radial styloid |
| (2) No bone tenderness | (2) Bone tenderness             |
- (D) Sprained wrist: from: fracture scaphoid
- |                                 |   |
|---------------------------------|---|
| (1) Normal anatomical snuff box | (1) Anatomical snuff box tender and swollen |
| (2) Clear & ten days            | (2) Chronicity                              |
- (E) Trauma hip femoral

(F) Sprained ankle from Pott's fracture "

- |                         |                                  |
|-------------------------|----------------------------------|
| (1) Tender external lig | (1) Tender internal lig          |
| (2) Pain on inversion   | (2) Pain on springing the fibula |

(12) Following fractures are noted for slow union due to deficient blood supply:

- (1) Shaft of the humerus
- (2) Lower third of the ulna
- (3) Lower third of the tibia
- (4) Neck of the femur
- (5) Carpal scaphoid

(13) Following fractures are noted for non-union due to inadequate immobilization

- (1) Carpal scaphoid shearing
- (2) Ulnar shaft rotation
- (3) Humeral shaft rotation
- (4) Tibial shaft rotation
- (5) Femoral neck shearing + rotation
- (6) Plated fractures

(14) Following fractures fail to unite due to interposition of soft parts

- (1) Ulnar styloid
- (2) Patella
- (3) Internal humeral epicondyle
- (4) Tibial tubercle

(15) Assuming there is a continuous hematoma between the fragments, there is only one cause of non-union and that is failure of adequate immobilization

- (a) Inadequate immobilization
- (b) Immobilization for inadequate period

(16) Following fractures unite however treated

- (a) Fracture clavicle
- (b) Fracture lower end of radius
- (c) Fracture rib

(17) There is no fixed period of immobilization in a fracture. A fracture must be immobilized till there is a complete clinical and radiographical union. Interference merely in response to the dictates of a calendar is disastrous.

(18) Constant movements of fragments upon one another lead to pseudarthrosis especially in

- (a) Ill nourished intra-articular bones
  - (1) Femoral neck
  - (2) Navicular

(b) *Transverse fractures*

- (1) Lower third of tibia
- (2) Mid third of radius

- (19) Fractures near the joints which are surrounded by short fibred muscles passing only over one joint have a tendency to myositis ossificans and abundant callus formation
  - (1) Sub and perthrochanteric femoral fractures
  - (2) Elbow fractures
- (20) Quadriceps drill must be done every two hours for five minutes in every case of immobilization of lower extremity
- (21) Every joint which does not need to be immobilized must be actively exercised from the first day of injury
- (22) Relaxation of knee ligaments is directly proportional to the wasting of the quadriceps and does not depend on the site of traction. It recovers fully when the tone of the thigh muscles is regained.
- (23) If continuous traction is required for a fracture of the leg bones, the pin should be inserted through the lower shaft of the tibia about two inches above the ankle joint.
- (24) Metallic foreign bodies should not be used in fractures of
  - (a) Olecranon
  - (b) Humeral condyles
  - (c) Tibial tuberosities
  - (d) Patella
- (25) In every fracture or dislocation, test all the nerves going past the site.
- (26) A.B.C. of fracture treatment
  - (A) Reduction    correction of displacement under x-ray
  - (B) Immobilization    complete and uninterrupted till union is complete
  - (C) Functional activity    active daily exercises of joints which need not be immobilized
- (27) Hyperæmia of bone is always associated with decalcification and rachiæmia with sclerosis.
- (28) The pain of fracture is forgotten but not the pain of cutting open a plaster
- (29) Fractures where traction treatment is necessary
  - (A) Upper limb
    - (1) Bennett's fracture dislocation
    - (2) Phalanges
    - (3) Shaft of the radius
    - (4) Neck of the humerus

- (B) Lower limb (1) Every fracture of femoral shaft  
(2) Unstable fracture of tibia & fibula
- (30) Primary minimum requirements of operative treatment of simple fractures
- (1) 48 hours skin preparation
  - (2) 10 minutes hand scrub
  - (3) Exclusion of the skin
  - (4) No-touch technic
  - (5) Reliable staff (for asepsis)
- (31) Indications for operative reduction of fractures are
- Fractures of (1) Patella  
(2) Olecranon  
(3) Humeral epicondyle  
(4) Internal malleolus  
(5) Femoral neck
- (32) Internal fixation must always be supported by external fixation, failing which, non union is sure to follow
- (33) Splints in common use for fractures
- (A) Upper limb (a) Thomas arm splint  
(b) Robert Jones
- (B) Lower limb (a) Thomas knee splint  
(b) Braun's splint
- (34) Indications for operative treatment of fractures
- (A) Immediate
- (1) Complicated (a) Rupture or pressure on main vessels  
(b) Injury to vital viscera
  - (2) Compound (a) Debridement (within 12 hours)  
(b) Winnett orr (after 12 hours)  
(c) Amputation (in bad cases)
- (B) Intermediate
- (1) Complicated (a) Injury to a joint  
(b) Injury to a nerve  
Ind (a) Joint sepsis  
(b) Total paralysis persistent after two weeks
  - (2) Persistent mal position inspite of  
(a) Efficient traction  
(b) Repeated manipulations
  - (3) Fractures of small bones or bony processes  
Patella olecranon epiphysis
  - (4) Septic fractures drainage

## (C) Remote

- (1) Septic fracture with general health deterioration
- (2) Late complications
  - (a) Myositis fibrosa or ossificans
  - (b) Neuritis fibrosa
  - (c) Aneurysm
- (3) Mal or non-union
- (4) Sepsis sequestrectomy

- (35) Finger exercises are of prime importance in the treatment of all forearm fractures.
- (36) An open or compound fracture is a surgical emergency no less urgent than acute appendicitis or duodenal perforation and must be as urgently operated upon under general anaesthesia.
- (37) Never introduce foreign material including catgut sutures or ligatures in the treatment of compound fractures.
- (38) Primary debridement of an open fracture is contraindicated
  - (1) After 24 hours of occurrence
  - (2) Profound shock
- (39) In primary treatment of open fractures
  - Avoid (1) Internal fixation
  - (2) Foreign sutures and ligatures
  - (3) Unpadded plaster cast
- (40) Most fractures of the body of the mandible are compound in the mouth. Irregularity in the line of the teeth is the most important sign.
- (41) In fractures of the clavicle, especially in patients over 40 there is only one real danger  
(Stiff fingers and a stiff shoulder)
- (42) Complication of fracture scapula or fractures round about shoulder is ankylosis of shoulder
- (43) Most common shoulder injury in children is an adduction fracture of the neck of the humerus.
- (44) Most common of all the shoulder injuries is the abduction fracture of the surgical neck of the humerus.
- (45) An abduction fracture of the surgical neck of the humerus must not be treated in abducted position, unless continuous traction is applied by Bohler's traction-abduction frame in 40° flexion and 90° abduction.
- (46) An adduction fracture of the anatomical neck of the humerus is treated on an abduction frame.

- (47) Supracondylar fractures, one of the commonest injuries of children and adolescents, is seldom sustained after the age of 20.
- (48) Fracture of lateral humeral condyle in children leads to non union ordinary supracondylar fracture leads to ankylosis.
- (49) Manipulative technic in supracondylar fracture of humerus (in the common type) traction → flexion → lateral compression.
- (50) Immobilization of elbow in extension
- (1) Fracture olecranon after manipulative reduction anterior slab
  - (2) Supracondylar fracture with forward displacement of distal fragment posterior slab
  - (3) Intercondylar T or Y fracture
  - (4) Separation of humeral metaphysis
  - (5) Forward dislocation of the elbow
  - (6) Fracture both bones in the upper third of forearm.
- (51) Avulsion of internal epicondylar epiphysis by traction of common flexor origin in valgus strains of the joint is one of the commonest injuries of the adolescents.
- (52) Fracture head of the radius may lead to permanent limitation of extension of elbow due to impact injury of the capitellum.
- (53) A fall on the outstretched hand, which impacts the head of the radius against the capitellum, is the cause of
- (a) Fracture radial head in adults
  - (b) Separation radial epiphysis in children.
- (54) If there is a fracture of one forearm bone with overriding or angulation, and there is no fracture of the other bone, there must be a dislocation of one of the radio-ulnar joints.
- (55) Fractures of the radius
- (A) Upper third immobilize in full supination
  - (B) Middle third
  - (C) Lower third
- } immobilize in mid position.
- (56) The most common cause of failure in the treatment of Colles fracture is an imperfect correction of the radial displacement.
- (57) Provided the finger exercises are done regularly the wrist joint takes care of itself even in plaster
- (58) Exercises for every case of upper limb fracture

- (A) Shoulder
    - (1) Full abduction
    - (2) Full overpron
    - (3) Full inversion
  - (B) Fingers
    - (1) Full extension
    - (2) Full abduction
    - (3) Full flexion.
- (59) In fracture of both the bones in the forearm, the plaster must extend from metacarpal heads to shoulder until union is complete as shown by X Rays.
- (60) No fracture is more commonly overlooked and no failure of diagnosis is penalized by non-union with greater certainty than the fracture of carpal scaphoid. Every patient who injures the wrist and is tender on the radial side must be assumed to have a fracture of the scaphoid until repeated radiographic examinations prove otherwise.
- (61) Union of carpal scaphoid is not sound until radiographs show complete obliteration of the line of fracture seen in
- (a) Anteroposterior film
  - (b) Lateral film
  - (c) Oblique film
  - (d) Delayed film
- (3 weeks after removal of plaster).
- (62) Treatment of fracture scaphoid
- (1) Recent fixation in dorsal plaster cast
  - (2) Delayed union prolonged plaster fixation
  - (3) Non-union
    - (a) Multiple drilling
    - (b) Bone-graft
  - (4) Avascular necrosis excision
  - (5) Arthritis wrist arthrodesis wrist.
- (63) Forcible passive movements lead to permanently stiff fingers.
- (64) Thumb is equal to half of the hand and should never be amputated unless absolutely unavoidable.
- (65) Fracture of the neck of the fifth metacarpal is the second commonest fracture in the hand.
- (66) Each finger in the flexed position points to the tubercle of the scaphoid and should be immobilized in that position in fractures of the proximal phalanx.
- (67) Every elderly patient who after slight injury to the hip complains of pain or is found to lie with the limb in external rotation must be assumed to have sustained a fracture of the neck of the femur. X Ray must be insisted in all hip injuries which do not clear up within ten days.

## (63) Classification of the femoral neck fractures

- (A) Abduction - Impacted subcapital Latent  
 (B) Adduction (a) Subcapital  
                   (b) Transcervical  
                   (c) Intertrochanteric } Basal.  
                   (d) Pertrochanteric }

## (69) Reduction of fracture neck of the femur

Traction → Internal rotation → Abduction.

## (70) Thomas knee splint is never excelled as a first aid treatment of lower limb fractures.

## (71) Non-union is rare while mal union is most common after fractures of the shaft of the femur

## (72) Operative exposure of the femoral shaft is followed by the danger of quadriceps adhesion.

## (73) The only treatment necessary for a good union of femoral shaft is continued, uninterrupted and efficient immobilization.

## (74) Before manipulating a stiff knee joint under anaesthesia be sure that

- (a) Patella is not ankylosed to the femoral condyles  
 (b) Quadriceps is not fixed to the femoral shaft.

## (75) Normal length of the lower extremity can easily be maintained by skin traction even in strong men with powerful muscles, if the Thomas splint is tied to raised foot of the bed.

## (76) Common deformity of fracture femoral shaft

- (1) Eversion  
 (2) Shortening  
 (3) Lessening of anterior curve.

## (77) See that the buttocks are off the bed in Galloway suspension method (in children)

## (78) Fractures involving the continuity of femur give rise in shortening of the limb due to less distance between anterior superior iliac spine and the adductor tubercle, shortening being above the trochanter major in cases of neck fractures.

## (79) Indications for various procedures in fracture femur

- (1) Sand bags very old patients with chest affections  
 (2) Thomas hip splint with callipers } senile debilitated patients  
 (3) Plaster of Paris (A) Fracture femoral neck  
                           (B) Fracture restive people  
                           (C) Post-operative



- (4) Gallows suspension children upto six years
- (5) Thomas knee splint
  - (1) Age between 5 and 15
  - (2) Shaft fracture without much displacement
- (6) Traction all complete shaft fractures in adults
  - (A) Adhesive
    - (a) Slight displacement
    - + (b) Weak muscles
  - (B) Skeletal
    - (a) Much displacement
    - + (b) Strong muscles
    - (c) Septic wounds
    - (d) Comminution
- (7) Operation
  - (a) Persistence of deformity inspite of one week's pin extension
  - (b) Fractures of processes or neck
  - (c) Compound fractures
  - (d) Complicated fractures
  - (e) Abnormal union
- (80) Special features of fracture lower femoral end
  - (1) Involvement of knee joint
  - (2) Pressure on popliteal vessels
  - (3) Complications
    - (a) ankylosed knee
    - (b) deformity
    - (c) osteoarthritis knee
- (81) Only about 50% of cases treated by Whitman method give bony union
  - (1) Intra-capsular fracture ends in non-union
  - (2) Impacted abduction fracture (latent) unites by Whitman.
- (82) Pauwel's grouping of fracture femoral neck
  - (1) Horizontal good prognosis no operation
  - (2) 30°—50° nailing
  - (3) Vertical bad prognosis nailing + pegging
- (83) After operative treatment of fracture femoral neck, the period before weight bearing is allowed should not be less than six months (X Ray evidence)
- (84) In most cases of ununited fractures of femoral neck the line of fracture is 50° or more from the horizontal.
- (85) The routine method of setting and fixing the femoral fractures should be by the use of traction + external splinting. If accurate reduction cannot be obtained open reduction + transfixion pin fixation + incorporation in plaster-of paris
- (86) Methods of internal and external fixation should be made allies and not rivals in difficult fractures.

- (87) Supracondylar skeletal traction gives rise to  
 (a) Permanent stiffness of the knee  
 (b) Infection osteomyelitis or arthritis.
- (88) Plaster spica is unsuitable for recent fractures of the femoral shaft, as it does not prevent backward angulation of the fragments.
- (89) In fracture patella  
 (A) Suture young adults  
 (B) Excision (a) Middle-aged and elderly  
 (b) Severe comminution.
- (90) Differential diagnosis of fracture patella is  
 Congenital bipartite patella bilateral.
- (91) Penalty of complete stiffness is more serious in knee joint than in any other joint of the lower limb.
- (92) Characteristic features of the fractures of leg bone shafts  
 (1) Compound and infected  
 (2) Tendency to redisplacements  
 (3) Disturbance of alignment leads to  
 (a) Serious disability  
 (b) Serious deformity  
 (4) Slow union  
 (5) Recurrent oedema of the foot and clawing of the toes.
- (93) Treatment in nutshell of fractures leg bone shafts  
 (A) Open fractures (a) debridement and suture-align  
 ↓ (b) reduction and fixation  
 (B) Infected fract (a) drainage  
 + (b) vaseline pack  
 + (c) skeletal traction  
 (C) Closed fracture (a) perfect reduction  
 + (b) plaster immobilization  
 or skeletal traction.
- (94) Unpadded cast is common in below knee fractures  
 (i) Ankle fractures  
 (A) Torn ligaments with or without fracture malleoli  
 (B) Short below knee walking plaster  
 Immediate walking  
 Removal of plaster after 3 weeks  
 (B) Fractures with displacement  
 (a) Reduction under local anaesthesia  
 (b) Plaster U stirrup  
 back slab  
 encircling bandage

- (2) Fracture tibia
- (A) Simple fracture without gross displacement,  
Immediate plaster cast
- (a) Lower third: upto mid thigh  
(b) Upper two-thirds upto groin
- (B) Comminuted fracture with gross displacement  
Transfixion pin incorporation plaster with Bohler's walking iron.
- (95) In fractures of the tibial shaft
- (a) Knee must be flexed to  $10^{\circ}$   
(b) Plaster must be as high as groin.
- (96) After treatment of all leg bones shaft fractures :
- (1) Regular exercises toes  
transverse arch  
quadriceps
- (2) Elastic leg support after removal of plaster
- (97) Transfixion of lower end of tibia is better than that of os calcis as the latter is apt to cause
- (a) Subastragaloid movement limitations  
(b) Talipes calcaneus  
(c) Osteomyelitis os calcis with purulent arthritis.
- (98) Injuries due to a fall from a height in the upright position
- (1) Fracture spine  
(2) Fracture-dislocation ankle  
(3) Fracture os calcis.
- (99) Every patient with a fractured spine must be examined for fracture os calcis and vice versa.
- (100) Axial or plantaro-dorsal X Ray plate is essential in suspected fracture of os calcis.
- (101) There is no fracture in the body which is harder to treat than a crush fracture of os calcis.
- (102) Fracture os calcis should be carefully looked for in every case of a fall from a height.
- (103) Always forewarn the patient of after-effects in fracture of os calcis
- (a) Flat foot  
(b) Osteoarthritis ankle.
- (104) Osteochondritis juvenilis

	<i>Name</i>	<i>Site</i>	<i>Age</i>
(1)	Perthe	Neck and head of femur	5-10
(2)	Osgood Schlatter	Tibial tubercle	10-16

	<i>Name</i>	<i>Site</i>	<i>Age</i>
(3)	Séver	Os calcis	10-16
(4)	Köhler	Tarsal navicular	3-8
(5)	Freiburg	Second metatarsal head	(
(6)	Scheuermann-calvé	Vertebrae	10-21
(7)	Madelung	Lower radius	15-25

- (105) Post traumatic osteoporosis
- (1) Kummel or Verneuil post traumatic spondylitis
  - (2) Kienbock post traumatic carpal dystrophy  
carpal semilunar
  - (3) Sudeck's post traumatic painful osteoporosis.
- (106) Clinical stages and their treatment of acute osteomyelitis
- (1) Stage of tension : Starr's decompression
  - (2) Stage of decompression closed antiseptic immobilization of Winnett Orr
  - (3) Stage of sequelae sequestrotomy
- (107) Persistent pain at the end of a long bone, associated with metaphyseal tenderness and general toxæmia is due to acute osteomyelitis.
- (108) A joint adjacent to the site of acute osteomyelitis must always be examined prior to the operation.
- (109) Involvement of multiple bones and joints, acute, subacute or chronic, some times arises after operation for a primary acute osteomyelitis focus.
- (110) Treatment of acute osteomyelitis is rest + sufficient drainage + packing
- (111) Treatment of acute osteomyelitis in children under two  
Treat the child not the lesion
- (1) Conservative fluids + rest + heat
  - (2) Incision and drainage definite abscess.
- (112) Two views of treatment of acute osteomyelitis
- (1) Early local decompression of Starr
  - (2) Late local drainage of soft tissue abscess when it presents of Tyrrel Grey
- (113) Any bone operation done with temperature over 102° is accompanied by heavy mortality
- (114) Splinting with weekly dressings give better results than Winnett Orr
- (115) A case of osteomyelitis may be said to be passing into a chronic stage if the sinus persists at the end of three months.
- (116) Syphilitic periostitis is seldom limited to one bone.

- (117) Diagnosis of osteomyelitis from sarcoma is particularly difficult in femur and humerus. Biopsy is the only certain method.
- (118) Remember Ewing's sarcoma in every case of osteomyelitis.
- (119) Three bone conditions in fingers to be differentiated are  
 (1) Tuberculous dactylitis  
 (2) Syphilitic dactylitis  
 (3) Enchondromata.
- (120) Rickets is a strain on homeostatic mechanism where integrity of one function (blood calcium to prevent tetany) is preserved at the expense of another function (calcification), less important in the body mechanism.
- (121) Metabolic diseases disturbing the calcium content of the bones  
 (1) Rickets abnormal deposition  
 (2) Osteomalacia  
 (3) Osteitis deformans  
 (4) Osteitis fibrosa } absorption after normal deposition
- (122) Normal calcium content of the blood distinguishes osteitis deformans from osteitis fibrosa.
- (123) Blood phosphatase is high in  
 (1) Osteitis deformans  
 (2) Hyperparathyroidism  
 (3) Bone tumours
- (124) A cancellous osteoma grows at the metaphysis of a long bone a compact osteoma grows on membranous bones.
- (125) Radium has no effect, on the other hand it tends to increase the growth of myelomata.
- (126) Growths of Plasma cells  
 (A) With Bence-Jones albumosuria  
 Myelomatosis of Kahler's disease  
 (B) Without Bence-Jones albumosuria  
 (a) Single plasmacytoma  
 (b) Multiple plasmacytomata
- (127) (1) Recurrence, (2) Rapid growth (3) Infiltration are common after operations on following benign growths  
 (1) Mixed parotid tumour  
 (2) Costochondral chondroma  
 (3) Urinary papilloma
- (128) Blood secondaries are more common in sarcomata because of  
 (a) Thin walls  
 (b) Close proximity of cells  
 (c) Vascularity

- (129) Bone sarcoma: some points
- (1) More than half are preceded by definite trauma
  - (2) Most constant symptom is pain
  - (3) Most common age is 10 to 20
  - (4) Most common sign (a) local tumour  
(b) local fracture
  - (5) Most common metastases are in lungs  
Bronchitis in old age
- (130) Any case of constant or increasing localized pain in a bone of unexplained origin, should be regarded as sarcoma and treated without delay
- (131) Early removal of the affected limb is by far the most effective method of treatment of bone sarcoma, followed by deep X Rays local and to the chest, repeated at intervals of 6-12 months for three years.
- (132) Local excision is enough treatment in cases of parosteal fibrosarcoma.
- (133) Secondary carcinomata usually occur in the proximal parts of the limbs.
- (134) Fluffiness and indefinite outline of compact tissue and the dulla is characteristic in X-Ray pictures of early bone sarcoma.
- (135) Innocent giant-celled tumour only destroys bone. In osteogenic sarcoma, some new bone is formed and growth is of varying consistency
- (136) Always take an X Ray picture of the lungs before the surgical treatment of bone sarcoma.
- (137) Treatment of bone sarcoma
- (1) Osteogenic amputation
  - (2) Ewing irradiation  
↓ amputation
  - (3) Parosteal excision  
↓ amputation
- (138) Ewing's sarcoma is radiosensitive
- |                        |                                  |
|------------------------|----------------------------------|
| Osteosarcoma           | } are non sensitive to radiation |
| Parosteal fibrosarcoma |                                  |
| Giant-celled tumour    |                                  |
- (139) (1) Local pain (2) Localized tenderness (3) Tumour (4) Pathological fracture (5) History of trauma are the main clinical picture of bone malignancy primary or secondary

(140) X Ray picture of different bone tumours :

- (1) Giant-celled
  - (a) Epiphysis-eccentric
  - (b) Multicystic expansion
  - (c) Trabeculations
  - (d) No ossification
  - (e) Rock bottom edge
- (2) Osteogenic
  - (a) Fluffy appearance
  - (b) Spindle swelling
  - (c) Cortical erosion
  - (d) Radiating ossification
  - (e) Codman's reactionary triangle
- (3) Ewing
  - (a) Patchy irregular coarse destruction
  - (b) Periosteal onion-peel reaction
- (4) Metastatic carcinoma
  - (a) cortical destruction  
(new formation in prostatic)

(141) Ages in bone tumours

- (1) Sarcoma 10-30
- (2) Giant-celled 20-30 (after union of epiphysis)
- (3) Metastatic carcinoma after 40

(142) Carcinoma breast gives rise to bony metastases more frequently than any other primary

(143) Pathological fracture due to

- (a) Sarcoma does not unite
- (b) Secondary carcinoma unites

(144) Any isolated bone lesion in old age ? metastatic carcinoma from

- (1) Breast
- (2) Thyroid
- (3) Hypernephroma
- (4) Prostate
- (5) Bronchus

(145) Introduction of pins in fractures of long bones

- (1) Fracture neck of the femur
- (2) Fracture upper third of femoral shaft
- (3) Fracture upper part of the ulna

(146) At least six months to a year must elapse between the healing of a septic process and bone-grafting

(147) Treatment of ununited fractures

- (1) Beck's drilling
- (2) Matti's bone piece pack
- (3) Autogenous massive graft

(148) Combined transfixion pin and Plaster-of Paris

- (1) Fracture tibia
- (2) Fracture os calcis
- (3) Fracture forearm bones

- (149) Main principles of fracture treatment
- (1) Reduce
    - (a) As soon as possible
    - (b) As perfectly as possible
    - (c) Under X Ray control
  - (2) Fixation without interruption until firm union
  - (3) Function of the injured limb during the period of immobilization
  - (4) Unpadded cast
  - (5) Duration of plaster fixation depends on
    - (a) Age of the patient
    - (b) Degree of injury
    - (c) Function of the part
  - (6) Under 12 years it is very difficult to get poor results  
After 40 years it is very difficult to get good results.
- (150) Local anaesthesia is very good for reduction of
- (1) All below knee fractures
  - (2) All wrist and forearm fractures
  - (3) Fracture femur
    - (a) Intracapsular neck
    - (b) Shaft.
- (151) It is better to use no splint at all in fractures of infancy
- (152) Essentials of bone-graft operations
- (1) Accurate fitting
  - (2) Complete immobilization
  - (3) Prolonged immobilization
- (153) Plasters necessary for bone-graft operations
- | <i>Ununited fracture</i> | <i>Plaster</i>              |
|--------------------------|-----------------------------|
| Lower shaft tibia        | Toes to groin (knee flexed) |
| Upper shaft tibia        | Toes to hip spica           |
| Lower shaft femur        | Toes to hip spica           |
| Upper shaft femur        | Toes to double hip spica    |
| Shaft radius & ulna      | Hand to upper arm           |
| Shaft humerus            | Shoulder spica              |
- (154) The main mass of the bone-graft is nothing more than an internal splint and a bone conducting scaffold, which is ultimately absorbed and replaced by new bone.
- (155) The abduction splint is the main stand-by in the treatment of nearly all shoulder injuries.



## CHAPTER VIII

# THE JOINTS

### (I) CONGENITAL ABNORMALITIES:

- (1) CONGENITAL DISLOCATION OF THE HIP  
(See under deformities)
- (2) SPRENGEL'S SHOULDER (See under deformities)

### (II) TRAUMA

#### (1) SPRAIN

Def Overstretching of ligaments with or without rupture

Etio Predisposer Osteogenesis imperfecta congenita  
Exciting Direct or indirect strain

Path (1) Rupture of ligament fibres  
(2) Synovitis with serous effusion

Clinic (1) Local pain on stretching the sprained ligament  
(2) Local tenderness  
(3) Synovial effusion

Diff. diag (1) Dislocation  
(2) Fracture (Carpal scaphoid)

Compl (1) Dislocation  
(2) Fracture  
(3) Adhesions  
(4) Infection  
(5) Recurrence  
(6) Osteoarthritis  
(7) T. B. Arthritis

Treat (A) (1) Rest in elevation with cold applications  
↓ (2) Elastic bandage with counter irritants, heat and massage  
↓ (3) Active movements  
↓ (4) Active movements against resistance  
↓ (5) Weight bearing  
Ind Complete disappearance of pain tenderness and effusion  
↓ (6) Thickening of the sole borders and heel of the boots  
(B) Leriche's (1) Periarthral local novocain injection  
↓ (2) Immediate function  
(C) Strapping or unpadded dorsal plaster cast

## (II) DISLOCATIONS

**Def Dislocation** Complete displacement of normal bony relations

**Sub-luxation** Partial displacement, so as not to lose contact

**Eti (1) Congenital**

**Cause** Incomplete development of bony constituents

**Site** Hip joint

**(2) Pathological**

**Causes (a) Destruction** Bones

Travelling acetabulum

Triple knee displacement

**(b) Distension** Ligaments

Charcot's joint

**(c) Disturbance of muscular balance** Spasm

Paralysis

**(3) Traumatic**

**Eti Age** Middle

**Sex** Male

**Occup** Laborious

**Anatomy (a) Mobility of the joint**

**(b) Type of the joint**

**Path (1) Ligaments torn**

**(2) Bones displaced, fractured**

**(3) Synovium contused or torn**

**(4) Serous or hæmorrhagic effusion**

**(5) Trauma to extra-articular structures**

**Clinic (1) History**

**(2) Pain (a) Local**

**(b) Referred**

**(3) Loss of function locking**

**(4) Deformity**

**(5) Anomalous relations of bony points**

**(6) Abnormal mensuration**

**(a) Local bony landmarks**

**(b) Limb**

**(7) X Rays**

**Compl (1) Fracture dislocation**

**(2) Unreduced dislocation**

- (3) **Complicated dislocation**
  - (a) Vessels gangrene or Volk mann
  - (b) Nerves neuralgia or paralysis
  - (c) Muscles & tendons rupture
- (4) **Compound dislocation**
- (5) **Recurrent dislocation** shoulder  
mandible
- (6) **Ankylosis**
  - (a) Adhesions
  - (b) Extra articular  
Callus  
Fibrosis  
Myositis ossificans
- (7) **Arthritis**
  - (a) Traumatic
  - (b) Suppurative
  - (c) Osteoarthritis
- (8) **Sudeck's post traumatic acute bone atrophy**
- Treat (a) **Reduction** Under anaesthesia
  - By (A) Manipulations
  - (B) Traction
    - (a) Manual
    - (b) Weight
- (b) **Fixation** In reduced position
  - By (a) Bandages
  - (b) Splints
  - (c) Plasters
- (c) **After treat**
  - (a) Massage next day
  - (b) Normal joint movements  
Immediate
  - (c) Local joint movements  
After ten days
- (4) **Open reduction**
  - Ind (A) Failure of conservatism  
Time within a fortnight
  - (B) Compound dislocation

### (III) FRACTURE DISLOCATION

- (A) Primary fracture with secondary dislocation
- (B) Primary dislocation with secondary fracture
- (C) Primary fracture and dislocation  
(See under Joint Complications in Fractures)

## (IV) INTERNAL DERANGEMENTS (See under knee joint)

## (V) PENETRATING WOUNDS OF THE JOINTS

## (A) Recent cases with infection not likely

- Path (a) Cases seen within twelve hours  
 (b) No penetration of joint cavity  
 (c) Penetration by aseptic instrument  
 (d) No contact with septic material
- Treat (1) Sterilization of the wound  
 (2) Rest in the position of optimum function  
 (3) Aspiration if much distension  
 (4) Aspiration + Injection of 5 to 10 c.c. of 1-1000 acriflavine  
 (5) Aspiration + canula lavage  
 If turbid effusion

## (B) Border cases with infection probable

- Path (a) Cases seen after twelve hours  
 (b) Penetration by septic instrument  
 (c) Turbid effusion on aspiration
- Treat (1) Excision of wound debridement  
 (2) Irrigation of the joint  
 (3) Partial or complete closure  
 Drain upto but not into the joint  
 (4) Rest in the position of optimum function

## (C) Frank septic or late cases :

- Path (a) Intra-articular comminuted fracture  
 (b) Extensive intra-articular laceration  
 (c) Pyarthrosis
- Treat (1) Excision of the wound  
 (2) Removal of fragments  
 (3) Flaxine wash  
 (4) Adequate drainage  
 (5) Post irrigations  
 (6) Immobilization in position of optimum function

## (II) INFLAMMATION

## (A) TRAUMATIC ARTHRITIS:

## (1) TRAUMATIC SYNOVITIS

- Eti (1) Sprain  
 (2) Internal derangement
- Clinic (1) Joint effusion  
 (2) Position of greatest capacity  
 (3) Painful and limited movements  
 (4) Local tenderness

**Clinical varieties**

- |       |     |   |
|-------|-----|---|
|       | (1) | Acute   |
|       | (2) | Subacute  |
|       | (3) | Chronic   |
|       | (4) | Recurrent   |
| Compl | (1) | Sepsis  |
|       | (2) | Adhesions with ankylosis  |
|       | (3) | T. B. Arthritis   |
|       | (4) | Osteoarthritis  |
| Treat | (A) | Acute   |
|       | (1) | Rest with immobilization<br>In position of optimum function         |
|       | (2) | Cold lotions  |
|       | (3) | Firm bandage (compression)  |
|       | (4) | Aseptic aspiration if necessary                                     |
|       | (B) | Subacute  |
|       | (1) | Rubefacients and counterirritants                                   |
|       | (2) | Strapping and crepe bandage   |
|       | (3) | Massage and movements   |
|       | (C) | Chronic   |
|       | (1) | Strapping with counterirritants<br>+ Protected function of the limb |
|       | (2) | Plaster-of-Paris immobilization<br>↓ Protected function of the limb |

**(2) TRAUMATIC ARTHRITIS**

- |        |                                       |                           |
|--------|---------------------------------------|---------------------------|
| Causes | (1)                                   | Sprain                    |
|        | (2)                                   | Traumatic synovitis       |
|        | (3)                                   | Internal derangements     |
|        | (4)                                   | Intra-articular fractures |
|        | (5)                                   | Dislocation               |
| Clinic | Same as synovitis but more pronounced |                           |
| Compl  | Same as in synovitis                  |                           |
|        | (1)                                   | Fibrous or bony ankylosis |
|        | (2)                                   | Suppurative arthritis     |
| Treat  | (1)                                   | Treat the Etiology        |
|        | (2)                                   | As in synovitis           |

**(B) INFECTIVE ARTHRITIS :**

- |           |     |                 |
|-----------|-----|-----------------|
| Varieties | (1) | Pyogenic        |
|           | (2) | Specific        |
|           | (3) | Zymotic         |
| Etio      | (A) | Non-suppurative |
|           | (1) | Sympathetic     |
|           | (2) | Tuberculous     |
|           | (3) | Syphilitic      |
|           | (4) | Gonorrheal      |
|           | (5) | Dysenteric      |
|           | (6) | Zymotic         |

**(B) Suppurative**

- (1) Pyococcal
  - (a) Direct
  - (b) Regional extension
  - (c) Pyæmic
- (2) Gonorrheal
- (3) Pneumococcal
- (4) Tuberculous

- Morb. anat**
- (1) Synovium suppurating granulations  
veil of Billroth  
pannus
  - (2) Cartilages erosion necrosis absorption  
separation
  - (3) Bone ends rarefying osteitis  
hypertrophic osteophytes
  - (4) Ligaments softened, relaxed
  - (5) Bursa infected
  - (6) Muscles spastic, atrophied
  - (7) Contents effusion  
fibrous adhesions  
loose bodies

**Clinical classification**

- (A) (1) Non suppurative
- (2) Suppurative
- (B) (1) Acute
- (2) Subacute
- (3) Chronic
- (4) Recurrent
- (C) (1) Effusive hydrarthrosis
- (2) Hypertrophic (a) Synovial (b) Osseous
- (3) Atrophic
- (4) Plastic ankylosing

**Clinical features**

- (A) General toxæmia
- (B) Local
  - (1) Inflammatory swelling
    - (a) Shoulder under the deltoid  
along the biceps  
axilla
    - (b) Elbow either side of triceps
    - (c) Wrist under extensors  
under flexors
    - (d) Hip Scarpa's triangle

- (e) Knee sub-crural pouch  
patellar hollows  
(f) Ankle dorsum  
Either side of tendoachillis

(2) **Abnormal position**

- Factors (a) Greatest capacity  
(b) Muscle contractures  
(c) Pathological dislocation

(a) **Shoulder Adduction**

(b) **Elbow**

- (a) Flexion  $90^\circ$  + Pronation  
or (b) Flexion  $110^\circ$  + Mild position

(c) **Wrist slight flexion**

(d) **Hip**

- (a) Flexion + abduction + eversion  
↓ (b) Flexion + adduction + inversion

(a) **Knee Flexion  $45^\circ$**

(f) **Ankle Extension + Inversion**

(3) **Spasm of the muscles with wasting**

(4) **Limitation of movements (all the movements)**

- Factors (a) Pain  
(b) Muscle spasm

(5) **Pain**

Factors

- (a) Tension  
(b) Muscle spasm  
(c) Erosion of cartilages + starting pain

- Compl (1) **General** (a) Toxaemia  
(b) Septicaemia  
(c) Pyaemia  
(d) Amyloid disease

- (2) **Local** (a) Ankylosis  
(b) Pathological dislocation  
(c) Disorganization  
(d) Sinuses

- Treat (A) **Focal** Treat any primary septic focus  
(B) **General**

- (a) Antiseptics sulphonamides  
(b) Specifics antisera  
(c) Tonics

**(C) Local****(1) Conservative weight extension**

By Adhesive plaster method

In Optimum function position

**(a) Shoulder**(1) Abduction  $30^{\circ}$ - $50^{\circ}$ 

+ (2) Anterior to coronal plane

**(b) Elbow** (The position depends on occupation)(1) Straight and pronated  
Laborious occupationor (2) Flexion of  $135^{\circ}$  + pronation  
Left handor (3) Flexion  $90^{\circ}$  + mid position  
Aestheticor (4) Flexion  $90^{\circ}$  + midway  
between midposition and  
pronation  
Writersor (5) Flexion  $45^{\circ}$  + midway  
between midposition and  
supination  
Eating**(c) Wrist**Dorsiflexion  $15^{\circ}$  to  $30^{\circ}$ **(d) Hip**(1) Flexion  $20^{\circ}$ - $30^{\circ}$ + (2) Slight abduction  $20^{\circ}$ 

+ (3) Midposition

**(e) Knee** $5^{\circ}$ - $10^{\circ}$  of flexion**(f) Ankle**

(1) At right angle

+ (2) Slight inversion

**(2) Aspiration****(A) Simple aspiration**

Ind (1) Diagnostic

Rise in temp with effu-  
sion in joint

(2) Therapeutic

(a) Too much effusion

(b) Too long effusion

(c) Pyzemic joint

(d) Bad general condition



- (B) **Aspiration with closed irrigation**  
 By *flavine mercurochrome*, *eusol*,  
*saline*  
 Ind (1) Recurrence after aspiration  
 (2) Pyæmic joint
- (3) **Operative**
- (A) **Arthrotomy—Irrigation—closure**  
 Ind (1) Suppurulent effusion  
 (2) Recurrences after aspiration
- (B) **Arthrotomy—Irrigation—Drainage**  
 Ind (1) Penetrating wounds with  
*sepsis*  
 (2) Failure of repeated aspirations  
 (3) Extension from a neighbouring focus  
 (4) Sudden exacerbation  
 (5) Severe toxæmia with  
*pyarthrosis*
- (C) **Arthrotomy—Carrel—Dakin—Drainage**  
 Ind Bad *pyarthrosis*
- (D) **Erasion**  
 Ind Subacute or chronic arthritis  
 with multiple septic foci on  
 the bony end surfaces
- (E) **Excision**  
 Ind (1) Failure of drainage  
 (2) Chronic stage prolonged  
 (3) Sinuses  
 (4) Fibrous ankylosis  
*painful*  
 (5) Ankylosis in bad position  
 (6) Upper extremity  
 (7) Adult age  
 Tech (a) With mobility  
 Upper extremity  
 (b) With arthrodesis  
 Lower extremity
- (F) **Disarticulation by open method**  
 Ind Purulent arthritis of the knee,  
 with life in danger  
 Tech Long anterior convex flap in-  
 cluding patella  
 After treat Re-amputation higher up



- (2) **Post pneumonic**  
 (a) History of pn  
 (b) Mild arthritis
- (3) **Septicæmic** (a)  
 (b)

**Diagnosis** (1) Infancy primary  
 or Pneumonia post  
 or Septicæmia septi

+ (2) One large joint

(3) Aspiration slight  
 conq

**Treat** (A) General chemothe  
 (B) Local

(1) Aspiration  
 (2) Arthrotomy —

**After treat** (1) Immobilization in  
 ↓ (2) Physiotherapy and

#### (D) TYPHOID ARTHRI

**Etio** Typhoid

**Time** Acute or convalescent pe

**Site** Hip joint

**Clinic** (1) Mild serous arthritis  
 ↓ (2) Severe suppurative

**Treat** Aspiration with closed la

#### (C) SPECIFIC ARTHRITIS:

##### (A) GONOCOCCAL ARTH-

**Etio** Frequency 2-5%

Sex Males

Site Knee-ankle-

Time Three weeks  
 charge

**Path** Gonococcal septicæmia at  
 articular structures and

**Bact** (1) Sterile  
 (2) Pure gonococcal  
 (3) Mixed  
 (4) Pyococcal

**Clinical varieties**

- (1) **Wandering Pains**  
 (2) **Arthralgia**  
 (3) **Hydrarthrosis**

Persistent and recurrent non inflammatory  
 serous effusion in a large joint

(4) **Acute arthritis**

Rapid inflammatory synovitis with periarticular oedema and swelling

(5) **Pyarthrosis**

(a) Acute

(b) Subacute

(c) Chronic

Local and general signs less marked

(6) **Periarticular subacute or chronic oligo-arthritis**

Sites Small or large joints, hands, feet

Path Articular and periarticular fibrous adhesions

(7) **Plastic ankylosing arthritis**

Adhesions and fibrous ankylosis

Quiet plastic arthritis

Atrophy of muscles

**Diagnosis** (1) Mono-articular or oligo-articular distribution in large joints

(2) Onset in several joints with settlement in one or two

(3) Urethral discharge prostatic massage

**Compl** (1) Fibrous ankylosis

(2) Rheumatoid arthritis

(3) Periarticular pseudo-ankylosis

**Treat** (1) Stop mechanical treatment of gonorrheal urethritis

(2) General vaccines chemotherapy protein shock

(3) Local

(A) Arthralgia counterirritants

(B) Hydrarthrosis

Aspiration + counterirritants

(C) Subacute oligo-arthritis

Scott's dressing + rest

(D) Acute arthritis

Counter irritants + rest

(E) Pyarthrosis (aspiration

↓ arthrotomy + lavage

↓ closure

(F) Plastic arthritis

Counter irritants + strapping

+ movements

(4) Special diathermy

**(B) SYPHILITIC ARTHRITIS****(I) Congenital****(A) Syphilitic osteochondritis** Pseudo-paralysis

Eti	Infant under two years
Clinic	(a) Aversion to movements
	(b) Joint effusion
	(c) Other stigmata
	(d) W R. or Kahn

**(B) Clutton's joints**

Eti	Age 10-18	school going
Site	Knee	
Clinic	(1)	Family history
	(2)	Painless, subacute, symmetrical serous synovitis
	(3)	Other stigmata
	(a)	Interstitial keratitis
	(b)	Deafness
	(c)	Hutchinson's teeth
	(4)	W R. or Kahn
	(5)	Therapeutic test

**(II) Secondary****(A) Arthralgia****(B) Hydrarthrosis**

Site Knee

Clinic Symmetrical bilateral painless

**(C) Plastic arthritis and periarthritis**

Site Knee, elbow midtarsal

Clinic Monarticular ankylosing

**(III) Tertiary****(A) Local synovial gumma**

Site Knee

Clinic Localized swelling

↓ Gummatous abscess

↓ Gummatous ulcer opening into the joint

**(B) Gummatous synovitis:**

Clinic Painless, irregular diffuse, synovial thickening

**(C) Chondro-arthritis**

Clinic Painless osteoarthritis with

(a) Synovial thickening

(b) No lipping

Treat (1) Local counter-irritation

(2) General antisyphilitic

**(IV) Parasyphilis** Charcot's joints

## (C) TUBERCULOUS ARTHRITIS

- Etio** (1) Of bone tuberculosis  
(2) Local neglected sprains
- Path**
- Origin** (1) Synovial membrane  
(2) Epiphysis } at the points of stress & strain  
(3) Metaphysis }
- Spread** (1) Subchondral  
(2) Perichondral synovial reflection
- Morb. anat** (1) Synovium pulpy pannus of T B granulations  
(2) Art. cart. necrosis (a) Subchondral  
(b) Peripheral  
(3) Bones : carious tuberculous rarefying osteitis  
(4) Soft tissues (a) White gelatinous swelling  
(b) Cold abscesses  
(c) Sinuses  
(5) Interior (a) Effusion : serous, pus, curdy  
(b) Melon seed loose bodies
- Path varies** (1) **Synovial** (A) **Acute** Acute synovitis  
(B) **Chronic** Tumour Albus  
Edema and infiltration of synovium and soft tissues  
(C) **Fungating**  
Exaggeration of (B)  
(D) **T B Hydrops**  
Effusion + melon-seeds  
(2) **Osseous** (A) **Ordinary** (See under bones)  
(B) **Carris Sicca**  
Marked bone atrophy  
Obliterated joint cavity  
Periarticular atrophy  
Gradual ankylosis
- Clinic**
- (A) **General** general signs and symptoms of tuberculosis  
(a) Evening temperature with sweats  
(b) Loss of weight
- (B) **Local** (1) **History** Of slight and neglected trauma  
(2) **Pain** (a) Aching relieved by rest  
(b) On movements  
(c) Starting pains

- (3) **Function** Weak → lost  
Weak grip  
Weak lift  
Limping
- (4) **Swelling** Spindle shaped
  - (A) Pseudo due to wasting of muscles
  - (B) Real
    - (a) Pulpy synovium
    - (b) Effusion
    - (c) Periarthicular oedema
- (5) **Deformity**
  - Factors
    - (a) Effusion
    - (b) Muscular spasm
    - (c) Pathological dislocation
    - (d) Ankylosis
- (6) **Muscular wasting**
  - (a) Measurements
  - (b) Pseudo-prominence of bones
  - (c) Alteration of natural outlines
- (7) **Palpation**
  - (A) Rise in temperature
  - (B) Synovial and perisynovial thickening
  - (C) Local tenderness
  - (D) Rigidity
  - (E) Effusion and loose bodies
- (8) **Movements** Limitation of all active and passive movements
  - Factors
    - (a) Muscular spasm
    - (b) Ankylosis
 Usually fibrous
- (9) **Mensuration**
  - (a) Shortening and lengthening
  - (b) Circumferential
- (10) **Other signs**
  - (A) Cold abscesses
  - (B) Sinuses
  - (C) Pathological dislocations
  - (D) Buristis

Sp. signs (1) **X Rays :**

- (a) Rarefaction
- (b) Fluffiness
- (c) Dislocations
- (d) Ankylosis
- (e) Alterations in joint space

- (2) **Aspiration** And examination of material
- (i) Microscopic
  - (ii) Culture
  - (iii) Guinea pig inoculation
- (3) **Tuberculin test**
- Diff diag (1) **Joint conditions**  
Any other acute, subacute or chronic arthritis
- (2) **Bone conditions**  
Osteomyelitis, periostitis, epiphysitis  
New growths
- (3) **Soft tissue conditions**  
Burnitis, fibrositis spasm of muscles
- (4) **Functional**
- Compl (1) **Abscesses** Cold
- (a) Sudden appearance
  - (b) Tendency to wander
  - (c) Lack of acute signs
- (2) **Sinuses**
- (3) **Extension to neighbouring tissues**  
Tendons, bursae
- (4) **Pathological dislocations**  
Wandering acetabulum  
Triple knee displacement
- (5) **Ankylosis**
- (a) Fibrous
  - (b) Bony (α) Spine  
(β) Secondary infection
- (6) **Acute generalized tuberculosis**
- (a) T B meningitis
  - (b) Acute miliary tuberculosis
- Etiol Manipulations under anaesthesia
- (7) **Toxaemia**
- (a) Tuberculous
  - (b) Septic secondary infection
  - (c) Amyloid
- Prognosis Factors (1) Age extremes bad
- (2) Family history and heredity
  - (3) Surroundings
  - (4) Stage of the disease
  - (5) Presence or absence of other foci
  - (6) Presence of other complications
  - (7) General health
  - (8) Reaction to treatment



## Treatment

(1) **General:** Sanatorium Rest + Diet + Tonics  
(Vit. D + Ca) + Heliotherapy

(2) **Specific** Tuberculin, A. O

(3) **Local**

(A) **Conservative**

(1) **Correction of Deformity** by:

- (a) Weight traction in the line of deformity to optimum position
- (b) Repeated plasters

↓ (2) **Fixation of the joint**

In Position of optimum function

By Plaster of Paris

For One year after cessation of all clinical and radiological signs

↓ (3) **Support and protected movements**

Celluloid or leather jackets

Splints

Walking callipers

(B) **Operative**

Ind (1) Early stage (extra-articular arthrodesis)

(2) Failure of conservative treatment

(a) Abscesses and sinuses

(b) Disorganization and dislocation

(c) Second focus

(d) Bad general condition

(3) Shortening the time of conservative treatment

(4) Improvement of faulty positions (osteotomy arthrodesis)

(5) Regaining mobility

(elbow temporo-mandibular joint)

(6) Getting rid of the focus (amputation)

Operations (1) **Extra-articular arthrodesis:** Hip

(2) **Aspiration** With injection of ether or iodoform

Ind Cold abscesses

Pyarthrosis

(3) **Arthrotomy—Lavage—Closure:**

Ind Doubtful diagnosis

Rapid pyarthrosis

(4) **Arthrectomy** Excision of affected tissues only

Ind Children with growing epiph

- (5) **Erasion** Excision of affected tissues  
+ Removal of a slice of articular cartilage  
Ind Children with growing epiphyses
- (6) **Excision** Excision of all intra articular soft tissues  
+ Excision of articular ends of bones  
+ Fixation of focus in epiphysis
- (A) **With fixation :**  
Ind As a rule
- (B) **With mobility at the joint**  
Ind Adults  
Superior extremity joints  
Contraind : Children upto 16  
Lower extremity joints
- (7) **Amputation**  
Ind (a) Septic sinuses  
(b) Recurrence after or failure of conservatism  
(c) Focus elsewhere  
(d) Toxaemia with general bad health

#### (D) TOXIC OR METABOLIC ARTHRITIS:

- Varieties (1) Focal secondary arthritis  
(2) Arthritis deformans  
(A) Rheumatoid arthritis  
(B) Osteoarthritis  
(3) Acute rheumatic arthritis  
(4) Gout

##### (1) FOCAL SECONDARY ARTHRITIS

- Etiol (Septic focus tooth tonsil etc.)
- Clinic (1) Acute, (2) Subacute (3) Chronic  
(1) Monarticular (2) Oligarticular  
(3) Polyarticular
- Treat (1) Treatment of primary focus  
Tonsillectomy removal of teeth etc.  
(2) Specific  
Anti sera, vaccines  
(3) Conservative treatment of arthritis

##### (2) ARTHRITIS DEFORMANS

- Varieties (1) Acute polyarticular  
(2) Chronic polyarticular  
(3) Chronic monarticular

### (A) RHEUMATOID ARTHRITIS

**Def** Slowly progressive, bilateral, symmetrical crippling polyarticular disease, with acute subacute or insidious onset involving first the metacarpophalangeal and proximal interphalangeal joints, leading to thickening of the soft parts with fibrosis and contractures and atrophy of cartilage, bone muscles and tendons, in women under 40.

Etu Sex female

**Age** 20-40

Predisposers

- (1) Congenital
- (2) Endocrine disturbance
- (3) Metabolic
- (4) Neurotrophic
- (5) Toxic
  - (a) Non-specific
  - (b) Infective
  - (r) Intestinal
- (6) Infective microbic
  - (a) Specific
  - (b) Mixed

Path (A) Atrophy of articular elements:

### Bones and cartilages

(B) Infiltration, fibrosis and contracture of synovium and periarthicular elements

Morb. anat (1) Synovial membrane and periarthicular soft tissues

- (a) Infiltration
- ↓ (b) Fibrosis
- ↓ (c) Thickening, contractures, adhesions

(2) Bones and cartilages  
Atrophy

(3) Ligaments, muscles and skin  
Atrophy

(4) Synovial fluid  
Reduced

(5) General toxic, vasomotor and neurotic changes

### Clinical varieties

- (1) Acute
- (2) Subacute
- (3) Chronic
- (4) Still a disease

(1) **Prodromal stage**

- (a) Sensory
- (b) Motor
- (c) Vasomotor



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(r) Intestinal  
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Bones and cartilages

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(2) Bones and cartilages  
Atrophy  
(3) Ligaments muscles and skin  
Atrophy  
(4) Synovial fluid  
Reduced  
(5) General toxic, vasomotor and neurotic changes

**Clinical varieties**

(1) Acute  
(2) Subacute  
(3) Chronic  
(4) Still's disease

(1) **Prodromal stage**

(a) Sensory  
(b) Motor  
(c) Vasomotor

- (2) **Active stage**
- (A) General (a) Pyrexia  
(b) Tachycardia  
(c) Vasomotor symptoms
- (B) Local Symmetrically bilateral polyarticular fusiform swellings of the small joints of the hand with onset  
(a) Acute with pyrexia  
or (b) Subacute with pyrexia  
or (c) Insidious without pyrexia
- (C) Regional (1) Muscular spasm and atrophy  
(2) Vasomotor signs  
(3) Garrod's nodules  
(4) Spender's patches
- (3) **Sequelæ stage**
- (a) Articular atrophy  
(b) Periarticular contractures limited movements  
(c) Deformities (1) Flexion type  
(2) Extension type  
(3) Mixed type  
(4) Ulnar deviation type  
(d) Regional atrophic changes muscles, skin
- Diff. diag (1) Acute rheumatism  
(2) Gonorrheal rheumatism  
(3) Osteoarthritis  
(4) Chronic gout
- Sequelæ Crippling and deformities
- Treat (1) General (a) Metabolic  
(b) Detoxic  
(c) Tonic  
(d) Parathyroidectomy  
(2) Local (a) Complete rest with extension  
↓ (b) Massage hyperemia, electrotherapy  
↓ (c) Passive and active movements

### STILL'S DISEASE

Etiology Age before second dentition

- Clinic (1) Joints stiffness and fusiform swelling of multiple symmetrical joints with  
(a) Synovial thickening  
(b) Periarticular thickening  
(c) Effusion  
(d) Muscular wasting



## (2) Active stage

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 (b) Tachycardia  
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 (4) Spender's patches

## (3) Sequelae stage

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 (b) Periarticular contractures limited movements  
 (c) Deformities (1) Flexion type  
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Sequelae Crippling and deformities

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 (b) Detoxic  
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## STILL'S DISEASE

Etio Age before second dentition

- Clinic (1) Joints stiffness and fusiform swelling of multiple symmetrical joints with  
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 Bones and cartilages

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                   (a) Infiltration  
                   ↓ (b) Fibrosis  
                   ↓ (c) Thickening contractures, adhesions  
 (2) Bones and cartilages  
       Atrophy  
 (3) Ligaments muscles and skin  
       Atrophy  
 (4) Synovial fluid  
       Reduced  
 (5) General toxic, vasomotor and neurotic changes

**Clinical varieties**

(1) Acute  
 (2) Subacute  
 (3) Chronic  
 (4) Still's disease

(1) Prodromal stage

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 (b) Motor  
 (c) Vasomotor

## (2) Active stage

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## (3) Sequelæ stage

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 (b) Periarticular contractures limited movements  
 (c) Deformities (1) Flexion type  
 (2) Extension type  
 (3) Mixed type  
 (4) Ulnar deviation type  
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 (2) Gonorrheal rheumatism  
 (3) Osteoarthritis  
 (4) Chronic gout

Sequelæ Crippling and deformities

- Treat (1) General (a) Metabolic  
 (b) Detonic  
 (c) Tonic  
 (d) Parathyroidectomy
- (2) Local (a) Complete rest with extension  
 ↓ (b) Massage, hyperæmia, electrotherapy  
 ↓ (c) Passive and active movements

## STILL'S DISEASE

Etio Age before second dentition

- Clinic (1) Joints stiffness and fusiform swelling of multiple symmetrical joints with  
 (a) Synovial thickening  
 (b) Periarticular thickening  
 (c) Effusion  
 (d) Muscular wasting

(2) Lymph glands hard, discrete, painless enlargement

(3) Spleen enlarged

(4) Lymphocytosis

(B) **OSTEOARTHRITIS** (1) **Monarticular**  
(2) **Oligarticular**

Def Localized monarticular or oligarticular condition

With (A) **Central atrophy**

With grooving and eburnation

+ (B) **Peripheral hypertrophy**

With osteophytes

Due to Disturbances of nutrition of articular cartilages

Brought about by Trauma toxæmia, neurotrophic factors or metabolic products

Etio Elderly males

Predisposers (1) Septic toxæmia

(2) Arteriosclerosis

(3) Slight and repeated trauma

(4) Neural or metabolic factor

Sites knee, hip metacarpophalangeal joint of thumb or great toe

Path **Disturbance of nutrition of articular cartilage**

By (1) Septic absorption low grade toxæmia

or (2) Chronic repeated trauma

or (3) Arteriosclerosis

or (4) Nervous factor

or (5) Metabolic factor

or (6) Internal secretion disturbances

Morb. anat **Central degeneration and peripheral hypertrophy of articular cartilage**

(1) **Art. cart**

(A) Epiauticular and periauticular

Hypertrophy

Ecchondroses

} **osteocondrophytes**

(B) Central atrophy with eburnation

(2) **Synovial mem hypertrophied villi**

Synovial chondromata

Lipoma arborescence

(3) **Intra-articular menisc, ligaments tendons**

Disappearance, atrophy

(4) **Capsular ligament**

Ossification

(5) **Loose bodies**

(a) Separated articular cartilages

(b) Separated osteochondrophytes

(c) Separated hypertrophied villi

(6) **Baker's cysts**(7) **Heberden's nodes**

Symmetrical bony outgrowths from the bones of interphalangeal joints

Clinic (1) **Pain + stiffness + crepitus**

(a) Barometric joint

(b) Working loose

(2) **Limited or locked movements**(3) **Enlarged bony ends with osteophytes and villi**(4) \ Rays (a) **Osteophytes**

(b) Distorted shape of bone ends

(c) Increased density

(d) Heberden's nodes

(5) **Pressure symptoms**

Spondylitis deformans morbus coxae

Sites (1) **Hip Morbus coxae senilis**(2) **Knee joint** (a) **Dry type**(b) **Wet type**(c) **Intermediate type**(3) **Metacarpophalanx of thumb**(4) **Metatarsophalanx of hallux**(5) **Temporomandibular**Treat (1) **Conservative**(1) **Treat any primary focus**(2) **General tonics, endocrine**(3) **Local** (A) **Acute rest**(B) **Chronic physiotherapy**(2) **Operative**Ind (1) **Relief of pain**(2) **Relief of instability**(3) **Correction of faulty ankylosis**(4) **Mobilization**Operations (1) **Aspiration with oxygen replacement**(2) **Arthrotomy with evacuation of fluid with ether lavage****with chelotomy**(3) **Excision with arthroplasty****with arthrodesis**(4) **Parathyroidectomy**(5) **Sympathetic ganglionectomy**(3) **ACUTE RHEUMATIC ARTHRITIS**Clinic (1) **High pyrexia with perspiration**(2) **Wandering acute arthritis**(3) **Response to salicylates**- (4) **Heart or tonsil lesion**

## (4) GOUTY ARTHRITIS

Site Thumb or great toe

Clinic (1) Acute, subacute or chronic arthritis  
(2) Chalky deposits

## (5) NEUROTROPHIC ARTHRITIS

Neuropathic arthropathy

## (1) HYSTERICAL JOINTS

Def Hyperalgesia and muscular contracture without any organic joint lesion

Eti (1) Young women and girls

(2) Neurotic temperament

Clinic (1) Sudden dramatic, unexplained, complete onset

(2) Inspection (a) Unusual unpathological posture

(2) No muscular wasting

(3) Palpation (a) Superficial intense hyperalgesia

(3) Glove and stocking anaesthesia

(3) Distraction test

(4) Movements fixed rigidity with relaxation under

(4) Distraction

(4) Anaesthesia

(5) No primary pathological lesion

(5) Mental symptoms: neurotic, sensitive

Diagnosis: (1) X-Ray } No abnormality detected  
(2) General anaesthesia }

Diff. diag (1) Joint conditions

(2) Muscle conditions

(3) Nerve conditions

(4) Spinal and central diseases

Treat (1) General tonics

(2) Psycho-therapy

(3) Local no active treatment

## (2) CHARCOT'S JOINT

Def Degenerative arthritis secondary to nervous disturbances causing loss of trophic influence

Eti Causes (1) Tabes dorsalis: 80%.

(2) Syringomyelia

(3) Other nervous lesions

Frequency (1) In tabes dorsalis 3%  
(2) In syringomyelia 30%

Path (1) Nervous disturbance

+ (2) Loss of trophic influence

+ (a) Loss of pain → repeated trauma

+ (b) Loss of vasomotor control → vasodilation → absorption

+ (c) Loss of joint mechanism

+ (3) Degeneration + new bone formation

Morb anat	(1)	Articular ends	decalcification and absorption
	(2)	Peripheral	chondro-osteophytes
	(3)	Soft tissues	disintegration disorganization
Path. varieties	(1)	<b>Atrophic</b>	
	(a)	Absorption of bony ends	
	(b)	Lax capsule	
	(c)	Abnormal range of movements	
	(2)	<b>Hypertrophic</b>	
	(a)	Lumpy irregular osteophytes	
	(b)	Calcareous capsule	
	(c)	Locking of the movements	
	(3)	<b>Osteoarthritic</b> Midway between (1) and (2)	
	(4)	<b>Hydrarthrotic</b>	
	(a)	Effusion excessive	
	(b)	Atrophied bone ends	
	(c)	Lax capsule	
	(d)	Abnormal movements	
Sites	(1)	<b>Knee Tabes Dorsalis</b>	
	(2)	Hip	
	(3)	Foot and ankle	
	(4)	<b>Shoulder Syringomyelia</b>	
	(5)	Wrist	
	(6)	Elbow	
	(7)	Vertebrae	
Clinic	(1)	<b>Onset</b> Sudden, dramatic, painless	
	(2)	<b>Local</b>	
	(A)	Atrophic	painless abnormal mobility
	(B)	Hypertrophic	locking with irregular bony ends
	(C)	Osteoarthritic	crepitus + locking
	(D)	Hydrarthrotic	excessive effusion
	(3)	<b>X Rays</b> Atrophy hypertrophy Osteophytes, calcifications	
	(4)	<b>Associated diseases</b>	
	(A)	<b>Tabes Dorsalis (knee)</b>	
		Argyll-Robertson pupil	
		Loss of knee jerks	
		Ataxia	
		Anesthesia sole	
		Romberg's signs	
		Dysuria	
		Visceral crises	

## (4) GOUTY ARTHRITIS

Site Thumb or great toe

Clinic (1) Acute, subacute or chronic arthritis  
(2) Chalky deposits

## (5) NEUROTROPHIC ARTHRITIS

## Neuropathic arthropathy

## (1) HYSTERICAL JOINTS

Def Hyperalgesia and muscular contracture without any organic joint lesion

Eto (1) Young women and girls

(2) Neurotic temperament

Clinic (1) Sudden, dramatic, unexplained complete onset  
(2) Inspection (a) Unusual isopathological posture  
(3) No muscular wasting  
(3) Palpation (a) Superficial intense hyperalgesia  
(3) Glove and stocking anaesthesia  
(γ) Distraction test  
(4) Movements fixed rigidity with relaxation under  
(a) Distraction  
(3) Anaesthesia

(5) No primary pathological lesion

(6) Mental symptoms neurotic, sensitive

Diagnosis (1) X Ray } No abnormality detected  
(2) General anaesthesia }Diff. diag (1) Joint conditions  
(2) Muscle conditions  
(3) Nerve conditions  
(4) Spinal and central diseasesTreat (1) General tonics  
(2) Psycho-therapy  
(3) Local no active treatment

## (2) CHARCOT'S JOINT

Def Degenerative arthritis secondary to nervous disturbances causing loss of trophic influence

Fho Causes (1) Tabes dorsalis 90%  
(2) Syringomyelia  
(3) Other nervous lesionsFrequency (1) In tabes dorsalis 3%  
(2) In syringomyelia 30Path (1) Nervous disturbance  
↓ (2) Loss of trophic influence  
↓ (a) Loss of pain → repeated trauma  
+ (b) Loss of vasomotor control → vasodilatation → absorption  
+ (c) Loss of joint mechanism  
↓ (3) Degeneration + new bone formation

Morb. anat	(1) Articular ends decalcification and absorption
	(2) Peripheral chondro-osteophytes
	(3) Soft tissues : disintegration disorganization
Path. varieties	(1) <b>Atrophic</b>
	(a) Absorption of bony ends
	(b) Lax capsule
	(c) Abnormal range of movements
	(2) <b>Hypertrophic</b>
	(a) Lumpy irregular osteophytes
	(b) Calcareous capsule
	(c) Locking of the movements
	(3) <b>Osteoarthritic</b> Midway between (1) and (2)
	(4) <b>Hydrarthrotic</b>
	(a) Effusion excessive
	(b) Atrophied bone ends
	(c) Lax capsule
	(d) Abnormal movements
Sites	(1) <b>Knee Tabes Dorsalis</b>
	(2) Hip
	(3) Foot and ankle
	(4) <b>Shoulder Syringomyelia</b>
	(5) Wrist
	(6) Elbow
	(7) Vertebrae
Clinic	(1) <b>Onset</b> Sudden, dramatic, painless
	(2) <b>Local</b>
	(A) Atrophic painless abnormal mobility
	(B) Hypertrophic locking with irregular bony ends
	(C) Osteoarthritic crepitus + locking
	(D) Hydrarthrotic excessive effusion
	(3) <b>X Rays</b> Atrophy hypertrophy Osteophytes, calcifications
	(4) <b>Associated diseases</b>
	(A) <b>Tabes Dorsalis</b> (knee)
	Argyll-Robertson pupil
	Loss of knee jerks
	Ataxia
	Anæsthesia sole
	Romberg's signs
	Dysuria
	Visceral crises



## (4) GOUTY ARTHRITIS

Site Thumb or great toe

Clinic (1) Acute, subacute or chronic arthritis  
(2) Chalky deposits

## (5) NEUROTROPHIC ARTHRITIS

## Neuropathic arthropathy

## (1) HYSTERICAL JOINTS

Def Hyperalgesia and muscular contracture without any organic joint lesion

Eti (1) Young women and girls

(2) Neurotic temperament

Clinic (1) Sudden dramatic, unexplained, complete onset  
(2) Inspection (a) Unusual unpathological posture  
(b) No muscular wasting  
(3) Palpation (a) Superficial intense hyperalgesia  
(b) Glove and stocking anaesthesia  
(c) Distraction test  
(4) Movements fixed rigidity with relaxation under  
(a) Distraction  
(b) Anaesthesia

(5) No primary pathological lesion

(6) Mental symptoms neurotic, sensitive

Diagnosis: (1) X-Ray } No abnormality detected  
(2) General anaesthesia }Diff. diag (1) Joint conditions  
(2) Muscle conditions  
(3) Nerve conditions  
(4) Spinal and central diseasesTreat (1) General tonics  
(2) Psycho-therapy  
(3) Local no active treatment

## (2) CHARCOT'S JOINT

Def Degenerative arthritis secondary to nervous disturbances causing loss of trophic influence

Eti Causes (1) Tabes dorsalis 80%  
(2) Syringomyelia  
(3) Other nervous lesionsFrequency (1) In tabes dorsalis 3%  
(2) In syringomyelia 30Path (1) Nervous disturbance  
↓ (2) Loss of trophic influence  
↓ (a) Loss of pain → repeated trauma  
+ (b) Loss of vasomotor control → vasodilatation → absorption  
+ (c) Loss of joint mechanism  
↓ (3) Degeneration + new bone formation

Morb. anat	(1)	Articular ends	decalcification and absorption
	(2)	Peripheral	chondro-osteophytes
	(3)	Soft tissues	disintegration disorganization
Path. varieties	(1)	<b>Atrophic</b>	
		(a)	Absorption of bony ends
		(b)	Lax capsule
		(c)	Abnormal range of movements
	(2)	<b>Hypertrophic</b>	
		(a)	Lumpy irregular osteophytes
		(b)	Calcareous capsule
		(c)	Locking of the movements
	(3)	<b>Osteoarthritic</b>	Midway between (1) and (2)
	(4)	<b>Hydrarthrotic</b>	
		(a)	Effusion excessive
		(b)	Atrophied bone ends
		(c)	Lax capsule
		(d)	Abnormal movements
Sites	(1)	<b>Knee</b>	<b>Tabes Dorsalis</b>
	(2)	Hip	
	(3)	Foot and ankle	
	(4)	<b>Shoulder</b>	<b>Syringomyelia</b>
	(5)	Wrist	
	(6)	Elbow	
	(7)	Vertebrae	
Clinic	(1)	<b>Onset</b>	Sudden dramatic, painless
	(2)	<b>Local</b>	
		(A)	Atrophic : painless abnormal mobility
		(B)	Hypertrophic : locking with irregular bony ends
		(C)	Osteoarthritic : crepitus + locking
		(D)	Hydrarthrotic : excessive effusion
	(3)	<b>X Rays</b>	Atrophy hypertrophy Osteophytes calcifications
	(4)	<b>Associated diseases</b>	
		(A)	<b>Tabes Dorsalis</b> (knee)
			Argyll Robertson pupil
			Loss of knee jerks
			Ataxia
			Anæsthesia sole
			Romberg's signs
			Dysuria
			Visceral crises

## (4) GOUTY ARTHRITIS

Site Thumb or great toe

Clinic (1) Acute, subacute or chronic arthritis  
(2) Chalky deposits

## (5) NEUROTROPHIC ARTHRITIS

## Neuropathic arthropathy

## (1) HYSTERICAL JOINTS

Def Hyperalgesia and muscular contracture without any organic joint lesion

Eti (1) Young women and girls

(2) Neurotic temperament

Clinic (1) Sudden, dramatic, unexplained, complete onset

(2) Inspection (a) Unusual unpathological posture

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(3) Palpation (a) Superficial intense hyperalgesia

(3) Glove and stocking anaesthesia

(γ) Distraction test

(4) Movements fixed rigidity with relaxation under

(a) Distraction

(3) Anaesthesia

(5) No primary pathological lesion

(6) Mental symptoms neurotic, sensitive

Diagnosis: (1) X Ray } No abnormality detected  
(2) General anaesthesia }Diff. diag (1) Joint conditions  
(2) Muscle conditions  
(3) Nerve conditions  
(4) Spinal and central diseasesTreat (1) General tonics  
(2) Psycho-therapy  
(3) Local no active treatment

## (2) CHARCOT'S JOINT

Def Degenerative arthritis secondary to nervous disturbances causing loss of trophic influence

Eti Causes (1) **Tubes dorsalis** 80%.(2) **Syringomyelia**

(3) Other nervous lesions

Frequency (1) In tubes dorsalis 3%

(2) In syringomyelia 30%

Path (1) Nervous disturbance

↓ (2) **Loss of trophic influence**

↓ (a) Loss of pain → repeated trauma

+ (b) Loss of vasomotor control → vasodilatation → absorption

+ (c) Loss of joint mechanism

↓ (3) **Degeneration + new bone formation**



**(B) Syringomyelia (shoulder)**

- (1) Thenar and hypothenar atrophy
- (2) Dissociation of sensations
  - (a) No pain and thermal sense
  - (b) Normal tactile and muscle sense
- (3) Trophic changes hand
- (4) Scoliosis
- (5) Spastic legs
- (6) Unequal pupils

- Complications**
- (1) Hydrarthrosis
  - (2) Hæmarthrosis
  - (3) Fractures with non union
  - (4) Dislocations
  - (5) Infections
  - (6) Crippling

**Treat** Orthopaedic apparatus

**(IV) ABNORMAL CONTENTS IN THE JOINTS****(1) HYDRARTHROSIS**

**Def** Copious and persistent serous effusion in a joint

- Causes**
- (A) Traumatic arthritis
  - (B) Specific arthritis Syphilis gonorrhea
  - (C) Osteoarthritis
  - (D) Neurotrophic arthritis
  - (E) Intermittent hydrarthrosis

**Etio** Sex both  
Age 10-40

**Path** Anglo-neurotic oedema

**Clinic** Sudden intermittent effusion

**(2) HÆMARTHROSIS**

**Etio** (a) Traumatic  
(b) Blood conditions hæmophilia a, scurvy

- Clini**
- (a) Sudden rapid effusion
  - (b) Signs of arthritis
  - (c) Blood examination
    - (1) Coagulation time
    - (2) Blood platelets

- Compl**
- (a) Recurrence
  - (b) Adhesions and ankylosis
  - (c) Osteoarthritis

**Treat**

- (a) Rest and cooling lotion
- (b) Intravenous blood transfusion  
calcium gluconate or chloride

- (c) Intramuscular hæmoplastin  
coagulen ciba  
blood serum

(d) No surgical interference in blood conditions

### (3) PYARTHROSIS

- Causes Suppurative arthritis  
(1) Trauma with infection  
(2) Iyococcal local or pyæmic  
(3) Specific with secondary infection

### (4) LOOSE BODIES IN THE JOINT

- Sources (1) Synovial fluid hæmorrhagic clots  
T B melon seeds  
(2) Synovial membrane villous fringes  
synovial chondromata  
(3) Cartilage loose pieces of articular or semi-  
lunar cartilage chondrophytes  
(4) Bones osteophytes
- Nature (1) Fibrinous tuberculous joints  
(2) Fibrofatty (a) Osteoarthritis  
(b) Rheumatoid arthritis  
(c) Neurotrophic arthritis  
(3) Bony and cartilaginous  
(a) Osteoarthritis  
(b) Neurotrophic arthritis  
(a) Marginal  
(β) Osteochondrophytes  
(γ) Synovial chondromata
- Found in (1) Traumatic joints  
(2) Tuberculous joints  
(3) Osteoarthritis  
(4) Neurotrophic arthritis  
(5) Rheumatoid arthritis
- Sites (1) Knee (2) Shoulder (3) Elbow
- Clinic (1) Recurrent temporary locking + pain +  
effusion  
(2) Palpable loose body  
(3) Underlying synovitis or arthritis  
(4) X Rays
- Compl Osteoarthritis
- Treat Excision after exploration  
(a) Fixation by a needle  
or (b) Washed out by saline syringe

### (V) ANKYLOSIS

Def Diminution in the normal range of movements of  
a joint

**(A) False ankylosis**

Def Ankylosis due to extra-articular causes

Causes Extra-articular

- (1) Skin scars
- (2) Muscles contractures spasms
- (3) Fascia contractures
- (4) Tendons contractures
- (5) Nerves paralytic contractures  
irritation spasm
- (6) Bones callus, new growths
- (7) Vessels aneurysm

**(B) True ankylosis**

Def Ankylosis due to articular causes

**(1) Fibrous (a) Adhesions**

Fibrous bands uniting two mobile bony ends

**(b) Ankylosis**

Fibrous union of bony ends

- Causes
- (1) Traumatic synovitis
  - (2) Hemarthrosis
  - (3) Low grade infection
  - (4) Tuberculosis
  - (5) Gonorrhea
  - (6) Rheumatoid
  - (7) Sympathetic synovitis
  - (8) Prolonged immobilization

Clinic (A) Adhesions pain and limited movement which stretches the adhesion

- (B) Ankylosis (a) Slight painful mobility  
(b) \ Rays

**(2) Bony :**

- Causes
- (a) Pyococcal arthritis
  - (b) T. B. gonorrheal with secondary infection
  - (c) Osteoarthritis or Charcot
  - (d) Hypercalcemic ankylosing polyarthritis

Clinic

- (1) Absolute absence of mobility
- (2) No pain on attempts at movements
- (3) \ Rays
- (4) Hypercalcemia [in (d) above]

**(A) Pathological ankylosis**

Result of disease

**(B) Therapeutic ankylosis :**

Result of arthrodesis

- (A) Sound ankylosis    No active disease  
                                  Stationary position
- (B) Unsound ankylosis    Active disease  
                                  Progressive deformity

## Positions of ankylosis

<i>Joint</i>	<i>Pathological</i>	<i>Therapeutic</i>
Shoulder	{ Adduction Inversion	{ Abduction 45 - 90 Flexion 20° External rotation 15
Elbow	(a) { Flexion 90 Pronation or (b) { Flexion 110 Midposition	(a) Straight + Pronation Labourers (b) Flexion 135° + Pronation Left hand (c) Flexion 90° + Midposition Aesthetic (d) Flexion 90 + Midway between midposition and pronation Writers (e) Flexion 45° + Midway between midposition and supination Feeding
Wrist	Slight flexion	Dorsiflexion 45
Hip	(a) { Flexion Abduction Eversion ↓ (b) { Flexion Adduction Inversion	{ Flexion 20°-30° Abduction 20 Neutral rotation
Knee	Flexion 45	(a) Flexion 5 - 10 (b) Straight After excision and arthrodesis
Ankle	{ Extension Inversion	{ Right angle Slight inversion



**Treatment (1) Preventive**

- (A) Fixation in position of optimum function
- (B) Early physiotherapy and active movements

**(2) Curative****(A) Conservative****(1) Gradual weight extension****(2) Manipulations**

(a) Intermittant gradual

X(b) Forcible under anaesthesia

Conpl (a) Traumatic synovitis

(β) Fracture

(1) Reformation of adhesions

(2) Exacerbation of infection

**(B) Operative**

Ind (a) To increase or regain mobility

(b) To improve position

(c) To relieve pain

Oper (1) **Excision** With**(a) Arthroplasty**

Ind (a) Non-tuberculous

(β) Upper extremity

(γ) Mobile joints

**(b) Arthrodesis**

Ind (a) Tuberculous

(β) Lower extremity

(γ) Weight bearing

**(2) Extra-articular osteotomy**

With (a) Union in sound position

(b) False joint Femur

**(3) Extra-articular arthrodesis**

Ind (1) Removal of pain and instability of hip

(2) T.B. ankylosis

**(VI) OPERATIONS ON THE JOINTS****Pre-operative**

- (1) X-Ray
- (2) Plaster splint or extension preparation
- (3) Prolonged and efficient aseptic preparation
- (4) No touch technique
- (5) Tourniquet Use tourniquet in joint surgery
- Contraind (a) Abscess
- (b) Arteriosclerosis
- (c) Age over 50
- (d) Very long operation

- Removal (a) Open method  
Remove the tourniquet before closure  
↓ Deliberate ligation of bleeding points  
(b) Closed method  
Removal after closure and firm bandage
- Compl (1) Haemorrhage more loose application  
(2) Gangrene (a) Too long and too tight  
(b) Arteriosclerosis  
(3) Injury to (a) Skin  
(b) Vessels contusion.  
Volkmann  
(c) Nerve paralysis  
(4) Delayed healing
- (1) Manipulations under anaesthesia  
Ind (1) Traumatic periarticular extrasynovial adhesions  
(2) Intra-articular adhesions  
(a) Recent cases  
(b) Sterile cases  
(c) Mild adhesions
- Contraind (1) Firm ankylosis Fibrous or Bony  
(2) Dovetailing or bony block  
(3) Destruction of articular cartilage  
(4) Latent or present or recent sepsis  
(5) Old cases  
(6) Shortening of extra-articular important structures  
Vessels, nerves
- Compl (1) Traumatic synovitis  
(2) Reformation of adhesions  
(3) Exacerbation of infection  
(4) Fracture  
(5) Rupture of extra-articular structures  
Vessels, nerves, tendons
- Post-treat (1) Rest, elevation, bandage or cooling lotions for 48 hours  
(2) Active movements  
As soon after the acute phase as possible  
(3) Physiotherapy
- (2) Aspiration of joints  
Ind (1) Diagnostic  
or (2) Therapeutic  
In (a) Synovitis with much or prolonged effusion  
(b) Hydrarthrosis  
(c) Haemarthrosis  
(d) Pyarthrosis
- Tech Very rigid sepsis  
Sites (a) Through thin portion of the capsule  
(b) Avoid important structures

- (1) **Hip joint** Below the anterior superior spine  
Between (a) Sartorius  
& (b) Tensor fasciae latae  
Direction In + back + up
- (2) **Knee joint** Above and outer side of patella  
Direction downwards + slightly back  
wards
- (3) **Arthroscopy** Exposure of a joint  
Ind (1) **Diagnostic** (a) Some traumatic joints  
(b) Biopsy  
(2) **Infection** (a) Diagnosis  
(b) Drainage  
(3) **Trauma** (a) Setting fracture-dislocations  
(b) Repair or excision of torn intra-articular  
tissues  
(c) Removal of foreign or loose bodies  
(4) Preliminary to other operations on joints
- (4) **Arthrectomy**  
(a) Exposure  
(b) Dissection and curettage of only diseased foci  
Ind (a) Childhood  
(b) Disease of soft tissues only (synovial)
- (5) **Erasion:**  
(a) Exposure  
(b) Dissection and curettage of diseased foci  
(c) Removal of a slice of articular cartilage  
Ind (a) Focus in soft tissues and articular surfaces  
(b) Children
- (6) **Excision**  
Tech (a) Exposure  
(b) Excision of all intra-articular soft tissues  
(c) Excision of articular ends of the bones  
(d) Excision of the focus in the epiphyses  
Ind (1) Chronic persistent focus in the articular ends  
(2) Adults
- (7) **Arthroplasty:**  
Def Artificial pseudarthrosis for mobility

## Ind (A) Absolute

- (1) Bilateral ankylosis of the hip
- (2) Bilateral ankylosis of the elbow
- (3) Ankylosis temporomandibular joint

## (B) Good

- |                               |   |
|-------------------------------|---|
| (1) Traumatic                 | } Ankylosis<br>with no evi-<br>dence of<br>activity |
| (2) Staphylo or streptococcal |   |
| (3) Gonococcal                |   |
| (4) Pneumococcal              |   |

## (C) Medium

- (1) Fibrous ankylosis
- (2) Rheumatoid arthritis
- (3) Osteoarthritis

## (D) Bad tuberculosis

## (E) Adults

## (F) Upper limb and mandible

## Contraind

- (1) Active infection
- (2) Tuberculosis
- (3) Extensive adhesions of soft tissues
- (4) Muscular weakness or incoordination
- (5) Pathological bony ends
- (6) Children under 16

## Prognosis

- Good, in
- (1) Age 20-40
  - (2) General health good
  - (3) Mental aspect intelligent co-operating
  - (4) Absence of local scar tissue

## Sites

- (1) Good results
  - (1) Elbow
  - (2) Hip
  - (3) Jaw
- (2) Medium knee

## (8) Arthrodesis:

Def Bony fixation of a joint in best functional position

## Tech (A) Intra-articular

- Tech
- (a) Exposure
  - (b) Excision
  - (c) Apposition of raw bony surfaces
  - (d) Bone-graft across

## After treat

Fixation in best functional position  
By Plaster-of Paris  
For not less than three months

## (B) Extra-articular

- Tech
- (1) Exposure of bony points
    - (a) Proximal to the joint
    - (b) Distal to the joint

- (2) Preparation of the bony points
- (3) Bone-graft between the points
- After treat Prolonged fixation in optimum position
- Ind (1) Loss of muscle control
  - Infantile paralysis
  - (2) Painful joint
  - (3) Mal ankylosis
  - (4) Inveterate chronic disease
  - Tuberculosis osteoarthritis
  - (5) Lower limb weight supporting
- (C) Combined intra and extra articular arthrodesis

## DISEASES OF SPECIAL JOINTS

### (1) TEMPOROMANDIBULAR JOINT:

#### (1) TRAUMA

##### (A) Dislocation

- |           |  |
|-----------|--|
| Etiol     | (1) Blow on the chin   |
|           | (2) Dental extraction  |
|           | (3) Yawning  |
| Varieties | (1) Unilateral   |
|           | (2) Bilateral <ul style="list-style-type: none"> <li>(a) Forwards</li> <li>(b) Backwards</li> <li>(c) Upwards</li> </ul>                                     |
| Path      | (1) Traumatic  |
|           | (2) Pathological suppurative or osteoarthritic disorganization   |
| Clinic    | (1) Inability to close the mouth   |
|           | (2) Displacement <ul style="list-style-type: none"> <li>(a) Unilateral lateral to the opposite side</li> <li>(b) Bilateral downwards</li> </ul>              |
|           | (3) Palpation <ul style="list-style-type: none"> <li>(a) Hollow in front of tragus</li> <li>(b) Condyle in anterior position</li> </ul>                      |
| Compl     | (1) Adhesions fibrous ankylosis  |
|           | (2) Unreduced dislocation  |
|           | (3) Recurrent dislocation <ul style="list-style-type: none"> <li>(A) Snapping joint (See internal derangement)</li> <li>(B) Recurrent dislocation</li> </ul> |
|           | Etiol Disorganization of joint   |
|           | Laxity of capsule  |
| Clinic    | Habitual dislocation   |
|           | Easy reduction & recurrence  |
| Treat     | Hey Groves operation   |
|           | (Neck of the jaw tied to mastoid by forearm tendon)  |
| (4)       | Osteoarthritis   |

- Treat (1) Reduction pressure on the third molars by  
thumb down and back  
+ Simultaneous lift of the chin by  
last two fingers  
(2) Fixation by fourtailed bandage  
for three weeks  
(3) After treat liquid diet for a few days

(B) Fracture-dislocation

Etio Blows on the chin

- Path (1) Dislocation  
(2) Fracture (a) Neck of the mandible  
(b) Floor of the cranium  
(Central dislocation)

- Treat (1) Manipulations  
(2) Operative reduction  
(3) Excision of the head  
(4) Conservative → excision of the head

(C) Internal derangement snapping jaw

Etio Abnormal intra-articular meniscus

Path Slipping of the head with a snap

Clinic Snapping jaw

Treat Excision of the meniscus

(II) INFLAMMATIONS

- Special Etio (1) Traumatic  
(2) Infective  
(A) Pyogenic (a) Pyococcal  
Bursting of a parotid or  
middle ear abscess into the joint  
(b) Pyæmic  
(B) Specific gonorrheal  
(C) Osteoarthritis trismus + crepitus  
(a) Post-traumatic unreduced dislocation  
fracture dislocation  
recurrent dislocation  
snapping jaw  
(b) Toxic or metabolic

(III) ANKYLOSIS OF JAW TRISMUS

Varieties

(A) Intra-articular fibrous or osseous

- Etio (1) Infective suppurative arthritis  
Gonorrhea  
Pyococcal  
Pneumonic  
Tuberculous  
Typhoid

- (2) Traumatic arthritis
- (3) Hyper calcæmic polyarticular ankylosis
- (B) Extra articular fibrosis or ossification or in filtration
- Etio Burns, lupus, cancerum oris, myositis ossificans carcinoma
- (C) Bony block Pseudo ankylosis
- Etio Osteoarthritis  
Unreduced dislocation  
Callus formation  
Malunited fracture  
Tumours
- (D) Reflex spasmodic conditions
- Etio (a) Muscles tetanus, hysteria  
(b) Inflammatory parotitis, tonsillitis, lymphadenitis
- Clinic Painful or painless trismus
- Treat (1) Treatment of primary focus in reflex  
(2) Removal of the block where possible  
(3) Excision of the head  
Ind Fibrous ankylosis  
Unreduced dislocation  
Malunited fracture
- (4) Esmarch's operation Extra-articular pseud arthrosis  
Ind Advanced bony or fibrous ankylosis  
Destruction and fibrosis of surrounding muscles

#### (IV) OPERATIONS ON TEMPORO-MANDIBULAR JOINT

- (1) Excision for intra-articular ankylosis
- Ind Trismus (a) Dislocation condyle  
(b) Dislocation fibro-cartilage  
(c) Arthritic ankylosis
- Tech (1) Incision (a) Transverse along lower border of zygoma or on level with tragus  
or (b) Vertical parallel to ramus  
or (c) Curved incision as in mastoid operations severing the pinna
- (2) Preserve facial nerve branches
- (3) Exposure of the joint
- (4) Incision of the capsule
- (5) Excision of the condyle or removal of fibro cartilage
- (6) Closure

After-treat Early movements

- Compl (1) Transient facial palsy  
(2) Parotid fistula

(2) **Esmarch's operation for extra-articular ankylosis**

- Ind (a) Extra-articular ankylosis  
(b) Advanced intra-articular bony or fibrous ankylosis

- Tech (1) Removal of (a) Wedge (with apex at the alveolar margin) from the angle of the jaw  
(b) Ascending ramus  
(2) Interposition of muscles between bony surfaces

After-treat Early movements and exercises

(2) **STERNOCLAVICULAR JOINT :**

(1) **Dislocation**

- Eto (a) Falls on shoulder  
(b) Direct injury

- Varieties (1) Forwards  
(2) Upwards  
(3) Backwards

Clinic Local examination

- Compl (1) Pressure on vessels, nerves, trachea oesophagus (in upward and backward dislocation)  
(2) Unreduced dislocation  
(3) Recurrent dislocation

Treat (1) **Conservative**

- (A) Reduction backward pull on shoulders with knee against upper dorsal spine

↓ (B) **Fixation**

- In Shoulder braced back  
Arm adducted  
Elbow flexed

By Sling and a bandage

- Over (1) An axillary pad  
(2) Local pressure pad

(2) **Operative**

- Ind (a) Unreduced dislocation  
(b) Recurrent dislocation

- Tech (1) Wiring  
(2) Fascial graft  
(3) Excision



- (2) Traumatic arthritis  
 (3) Hyper calcæmic polyarticular ankylosis
- (B) Extra articular fibrosis or ossification or infiltration
- Etio Burns, lupus, cancerum oris, myositis ossificans carcinoma
- (C) Bony block Pseudo ankylosis
- Etio Osteoarthritis  
 Unreduced dislocation  
 Callus formation  
 Malunited fracture  
 Tumours
- (D) Reflex spasmodic conditions :
- Etio (a) Muscles tetanus, hysteria  
 (b) Inflammatory parotitis, tonsillitis, lymphadenitis
- Clinic Painful or painless trismus
- Treat (1) Treatment of primary focus in reflex  
 (2) Removal of the block where possible  
 (3) Excision of the head
- Ind Fibrous ankylosis  
 Unreduced dislocation  
 Malunited fracture
- (4) Esmarch's operation Extra-articular pseud arthrosis
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 Destruction and fibrosis of surrounding muscles

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After-treat Early movements

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(b) Advanced intra-articular bony or fibrous ankylosis

- Tech (1) Removal of (a) Wedge (with apex at the alveolar margin) from the angle of the jaw  
(b) Ascending ramus  
(2) Interposition of muscles between bony surfaces

After treat Early movements and exercises

(2) STERNOCLAVICULAR JOINT :

(1) Dislocation

- Eto (a) Falls on shoulder  
(b) Direct injury

- Varieties (1) Forwards  
(2) Upwards  
(3) Backwards

Clinic Local examination

- Compl (1) Pressure on vessels, nerves, trachea, oesophagus (in upward and backward dislocation)  
(2) Unreduced dislocation  
(3) Recurrent dislocation

Treat (1) Conservative

- (A) Reduction backward pull on shoulders with  
knee against upper dorsal spine

↓ (B) Fixation

- In Shoulder braced back  
Arm adducted  
Elbow flexed  
By Sling and a bandage  
Over (1) An axillary pad  
(2) Local pressure pad

(2) Operative

- Ind (a) Unreduced dislocation  
(b) Recurrent dislocation  
Tech (1) Wiring  
(2) Fascial graft  
(3) Excision

- (2) Arthritis (a) Traumatic  
 (b) Pyemic  
 (c) Tuberculous  
 (d) Gonococcal

### (3) ACROMIOCLAVICULAR JOINT

#### Dislocation

Etiol. Football and industrial accidents

Path (a) Subluxation coracoclavicular ligament intact  
 (b) Dislocation coracoclavicular ligament torn

Varieties (a) Superior  
 (b) Posteroinferior  
 (c) Anteroinferior  
 (d) Backward

Clinic (a) Displacement of clavicular end  
 (b) Synovitis  
 (c) X Rays

Comp (1) Unreduced dislocation  
 ( ) Recurrent dislocation

Treat (1) Conservative

(A) Reduction by manipulation

↓ (B) Fixation

In Arm adduction over an axillary pad

Elbow flexed

Hand to opposite shoulder

By Flastoplast

Around The clavicle and elbow

For 3 weeks in subluxation

5 week in dislocation

(2) Operative

(A) Wiring

(B) Suture fascial graft palmaris longus

(a) Clavicle to acromion

(b) Clavicle to coracoid

### (4) SHOULDER JOINT:

#### (A) CONGENITAL

Sprengel's shoulder (See under deformities)

#### (B) TRAUMA

- (1) Sprain: (a) Rupture of muscle: supraspinatus  
 (b) Rupture of tendon biceps  
 (c) Rupture of capsular ligament

(2) **Dislocation**

Etiology Middle-aged males (after 20)

Excitant Indirect trauma

With~ Outstretched arm with **abducted shoulder**(A) **Trauma in shoulder abduction**

Path (1) Tear in the inferior portion of the capsule

↓ (2) **Subglenoid** Lower margin of the glenoid  
 In front of long head triceps  
 Below subscapularis  
 Above teres minor

↓ (3) **Forward**(A) **Subcoracoid**

In front of scapular neck

Below the coracoid

Medial to glenoid edge

(B) **Subclavicular**

Below the outer end of clavicle

Under the pectoralis

(4) **Backwards**(A) **Subspinous**

Under the spine in infraspinatus fossa

(B) **Subacromial**

Under the acromion in supraspinatus fossa

(5) **Downwards Luxatio erecta**(B) **Impact along the long axis of superior limb in adducted and extended position**(1) **Supraglenoid dislocation**

With fracture acromion

Clinic (1) **Deformity**(A) **Flat shoulder**(B) **Axis of the arm**

(1) Upwards+inwards

(2) Backwards (if anterior)

(3) Forwards (if posterior)

(C) **Elbow** Away from the trunk

Posterior if anterior dislocation

Anterior if posterior dislocation

(2) **Painful and limited movements**(3) **Palpation**(A) Absence of head in *normal position*(B) Presence of head in *abnormal position*

- (4) **Mensuration** acromial tip to external condyle  
 (A) Shortening of the arm  
 (B) Lengthening of the arm (subglenoid)

- Special signs** (1) **Hamilton**: Acromion and ext. condyle in one straight plane  
 (2) **Dugas** Inability to place the hand on opposite shoulder on adduction of the elbow  
 (3) **Callaway** Increase in vertical measurement round the axilla  
 (4) **Bryant** Lowering of axillary folds

- Compl** (1) **Fracture-dislocation**  
**Sites** Neck, anatomical or surgical  
 Tuberosities  
 Glenoid rim  
 Coracoid process  
 Acromion  
**Clinic** (a) Failure of the head to rotate with shaft  
 (b) Crepitus  
 (c) Easy reduction and recurrence  
 (d) X Rays

- (2) **Complicated dislocation**:  
 (A) Pressure on vessels: oedema, cyanosis, gangrene  
 (B) Pressure on nerves: neuralgia, paralysis  
 (C) Rupture of muscles and tendons  
 Supraspinatus, biceps  
 Easy reducibility and easy recurrence

- (3) **Unreduced dislocation**  
**Causes** (a) Adhesions  
 (b) Interposition: capsule, biceps  
 (c) Fractures

- (4) **Recurrent dislocation**:  
**Etiol** (a) Frequent trauma: epilepsy  
 (b) Lacerated rotators  
 (c) Separation of tuberosities  
 (d) Capsule: torn or loose

**Clinic** Habitual recurrence on abduction of the arm with easy or even auto reduction

- (5) **Ankylosis**: Adhesions  
**Etiol**: (1) Periarthritis  
 (2) Fracture or dislocation

	(3) Therapeutic immobilization
Clinic	Deficient abduction and eversion
Treat	(1) Active exercises (a) Eversion ↓ (b) Abduction (2) Manipulations under anaesthesia
Ind	Failure of exercises
Contraind	Early inflammatory stage
	(6) Osteoarthritis (a) Unreduced dislocation (b) Recurrent dislocation
Treat	
(1) Conservative	
(A) Reduction	Under general anaesthesia
(1) Kocher	
	(a) Traction in the long axis of humerus
	(b) Flexion + adduction of elbow
	(c) Slow and gentle external rotation of the arm
	(d) Upward and forward position of elbow (front of the chest)
	(e) Swift internal rotation of arm (hand to opposite shoulder)
(2) Heel in axilla	Traction down and out
(3) Hyperextension	Traction
(B) Fixation	
In	(a) Adduction over axillary pad
or	(b) Partial abduction and eversion
If	(a) Fracture great tuberosity
	(b) Avulsion supraspinatus
By	Bandage and sling
For	Four days
After treat	(1) Distal joint exercises immediate
	(2) Massage following day
	(3) Shoulder active move 3 weeks
	(4) Shoulder abduction } 4 weeks
	(5) Sling discarding }
(2) Operative:	
Ind	(1) Failure of conservative measures
	Open reduction

(2) **Fracture-dislocation :**(A) Robert Jones manipulations  
150° abduction + traction + digital manipulations

(B) Open reduction

(3) **Old unreduced dislocation**

(A) Manipulations upto 2 months

(B) Open reduction after 2 months

(4) **Recurrent dislocation**(A) **Operations on capsule**

(a) Excision

(b) Plication + coracoid buttress Oudard

(c) Reattachment to glenoid Perthe

(d) Repair of ant. part Bankart

(B) **Operations on the humeral head**  
(slinging)

(a) Hey Grove fascia lata

(b) Nicola long biceps tendon

(c) Henderson fascial sling

(C) **Extra-articular operation**

Clairmont muscle sling

After treat Fixation

In Arm adducted

Forearm across the chest

For Two weeks

(C) **ACUTE INFECTIVE ARTHRITIS**

Clinic Position adduction or slight abduction

Swelling (a) Under the deltoid

(b) Along the biceps

(c) Axilla

Treat Position (a) 45 to 90° abduction

+ (b) 20° anterior to coronal plane

+ (c) 15° external rotation

(D) **TUBERCULOSIS OF THE SHOULDER**

Etiology Third decade

Pathology Caries sicca in humeral head

Clinic (1) Pain

(2) Weak function

(3) Swelling not marked

(4) Rigidity limitation of all movements

(5) Deformity adduction + inversion

(6) Muscular wasting pronounced

(7) Cold abscesses and sinuses

Diagnosis Wasted deltoid with painful restriction of abduction in middle age

- Diff. diag** (1) Other causes of arthritis  
 (2) Adhesions  
 (3) Subdeltoid bursitis - subacromial bursitis  
 (4) New growths

**Prognosis** Fibrous ankylosis in adduction and inversion

**Treat -**

- (1) **Conservative** (A) Weight extension to correct the deformity  
 ↓ (B) Fixation  
     In Optimum position  
     By Plaster of Paris
- (2) **Operative**: Excision

## (E) OSTEOARTHRITIS OF THE SHOULDER

- Clinic** (a) Elderly patient  
 (b) Painful movement  
 (c) Crepitus

## (F) CHARCOT'S SHOULDER JOINT

**Eti** Syringomyelia

- Clinic** (1) Shoulder condition atrophic, hypertrophic, hydrarthrotic  
 (2) Syringomyelia signs

## (G) OPERATIONS ON THE SHOULDER JOINT

### (1) Exposure

- Incisions** (A) **Anterior** (a) Along the anterior edge of the deltoid  
     From coracoid to tuberosity  
 (b) Separation of deltoid from pectoral
- (B) **Posterior**: (a) Acromioclavicular joint  
     ↓ Over the shoulder  
     ↓ Posterior axillary fold  
 (b) Division of acromial base  
 (c) Reflection of acromion with deltoid forwards

**Ind** Tuberculosis

### (C) Deltoid flap

- (a) Transverse incision across the top of the shoulder  
 (b) Division and downward reflection of deltoid

### (2) Arthroteny:

- Ind** (a) Infective purulent arthritis  
 (b) Loose bodies  
 (c) Lavage  
 (d) Irreducible fracture dislocations and epiphyseal displacements



- Tech (1) Exposure  
 (2) Incision into the capsule  
     For drainage (a) Anterior incision  
                   (b) Counter incision  
                   At the apex of the axilla with the arm drawn upwards above the head on a forceps passed across the joint cavity

(3) Excision:

- Ind (a) Tuberculosis  
 (b) Destructive infective arthritis  
 (c) Compound fracture dislocations  
 (d) Irreducible dislocation with  
     (a) Fracture humerus  
     (b) Failed manipulations  
     (c) Older than six weeks  
 (e) Tumours of the humeral head

- Tech (1) Exposure  
 (2) Dislocation of long tendon of biceps  
 (3) Open the capsule  
 (4) Detachment of both tuberosity muscle insertions  
 (5) Section of the bone  
     (a) Through anatomical neck  
     (b) Through the tuberosities  
 (6) Beveling the cut end  
 (7) Closure

- After-treat 1st day Splint or plaster in optimum position  
 10th day Renewal of plaster  
 22nd day Removal of superior part of arm and forearm part of plaster

Massage + fardum

- Three months Removal of the whole plaster

(4) Arthroplasty

- Ind (a) Malankylosis  
 (b) Ankylosis of shoulder + scapula  
 (c) Painful ankylosis  
 (d) Unreduced dislocation

- Essentials (a) Strong functioning deltoid  
 (b) Adequate lever

- Tech (a) Excision gap between the bones half inch  
 (b) Interposition of fascia lata  
     or subcutaneous tissues  
 (c) Closure

- After-treat 1st day Splint or plaster in optimum position  
 10th day Renewal of plaster  
 22nd day Removal of superior part of whole plaster  
     Active movements + physiotherapy

(5) Arthrodesis:

- Ind (1) T.B. Shoulder  
 (2) Flail shoulder  
 (3) Deltoid paralysis } with good acapular muscles

## Tech

## (A) Intra-articular

## (1) Excision: by anterior route

## (a) Head present

Removal of opposing cartilaginous  
Surfaces and synovial membrane

## (b) Head absent

Freshening the under surfaces of  
Acromion, glenoid, humeral extremity

## (2) Bone-graft (A) Greater tuberosity

↓ Humeral head

↓ Glenoid

↓ Scapular spine

## (3) Position of ankylosis

## (A) Children 90° abduction

+ 30° eversion

+ Elbow in front of body line

## (B) Adults 70° abduction

## (B) Extra-articular

## Ind T. B. in adults

## Tech Insertion of acromion into greater tuberosity

## Position of ankylosis 80° abduction

+ 30° eversion

+ 30° flexion

## After-treat Fixation

In Shoulder in optimum position

Elbow at right angles

Wrist dorsiflexed

By Plaster of Paris

extent Over both the shoulders to hip round the trunk

For Three months

Removal of forearm and arm part only of the superior aspect of  
the plaster + physiotherapy after 3 weeks

## (6) Recurrent dislocation of the shoulder

## (A) Bankart (a) Anterior incision

(b) Coracoid division

(c) Subscapularis tenotomy

(d) Repair of the glenoid ligament

## (B) Oudard (a) Separation of anterior deltoid

(b) Coracoid division

(c) Subscapularis tenotomy

(d) Fixation of the capsule

(e) Subscapularis shortening

(f) Turning down coracoid with muscles

(g) Closure

## After-treat Fixation

In Arm adduction

Elbow flexion 90°

By Plaster of Paris

For Ten weeks

© Chabrent

**Tech:** (1) Anterior deltopectoral incision  
(2) Dissection of quadrilateral space  
(3) Posterior incision: along posterior deltoid edge  
(4) Dissection of posterior strip off deltoid  
(5) Suture of the strip end to: anterior deltoid  
or: subscapularis  
through quadrilateral space

After-treat Arm bandaged to the side with sling to forearm  
Movements of elbow 2nd day  
Movements of shoulder 22nd day

(5) ELBOW JOINT:

### (1) DISLOCATION

Etio (1) Falls on hand with  
(a) Extended elbow  
(b) Flexed pronated forearm } backward  
(2) Falls on flexed elbow forward  
(3) Twists lateral or ulna only

(A) Both bones :

Title	Age	Children and adolescents
Frequency		Next to shoulder

### Varieties (1) Posterior

Associated (a) Fracture coronoid (after 14)  
(b) Brachialis laceration

(2) Anterior:

Associated (a) Fracture olecranon  
(b) Triceps laceration

**Complications** Ulcer, paralysis

(3) **Lateral: Incomplete**

**Associated Fracture epicondyle**

(4) *For*

- (3) Recurrent dislocation  
Fracture olecranon or coronoid
- (4) Complicated dislocation
  - (a) Vessels gangrene  
Volkmann
  - (b) Nerves median, radial ulnar
  - (c) Muscles myositis ossificans brachialis
- (5) Arthritis
  - (a) Traumatic
  - (b) Infective
  - (c) Osteoarthritis
- (6) Extra-articular ankylosis

**Treat**(1) **Conservative :**(A) **Reduction**

- (1) Posterior flexion of the elbow  
across the knee →  
traction on the forearm
- (2) Anterior traction → extension →  
local pressure from the  
front

(B) **Fixation**

- in (a) Posterior  
Elbow at right or acute angle
- (b) Anterior  
Elbow extended

- by (a) Posterior
  - (α) Posterior gutter splint
  - (β) Posterior plaster slab
  - (γ) Collar-cuff sling
- (b) Anterior  
Anterior plaster slab

(C) **After treat**

- (a) Finger and shoulder exercises  
Immediate
- (b) Elbow exercises three weeks
- (c) Sling discontinuation three weeks

(2) **Old unreduced dislocation**

- (A) Manipulations upto six weeks
- (B) Open reduction
- (C) Sham reduction
  - (α) Flexion above right angle
  - (β) Collar-cuff for three weeks
  - (γ) Active exercises

(D) Arthroplasty with plaster for four weeks

(B) **Dislocation of the ulna only**

Etiology Twist of the forearm

Path. Posterior

(C) Dislocation of the radius only

### Etiology (a) Congenital

(b) Traumatic:

Path (a) Forward dislocation of the head

+ (8) Fracture upper third ulna

Clinic (a) Movements limited flexion and supination

+ normal propagation

(f) Position slight flexion

+ midway position

(7) Palpation tenderness

+ displaced head

+ ulnar fracture

**Treat (A) Conservative:**

(a) Reduction traction with backward local pressure

(b) **Fixation**

In Flexion + extension

Over anterior pad

(c) **Physiotherapy after 3 weeks**

(B) Operative :

Ind Recurrence

Tech Excision of head

(C) **Subluxation of the Radius:**  
(Pulled elbow)

**Eup** Young children

**Pull on forearm**

Path	Nipping of synovial membrane between orbicular ligament and radial head
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Clinic (n) Inability to supinate and extend

(b) Local pain and tenderness

Treat Full flexion

↓ Full extension

↓ Full supination

## (2) ARTHRITIS

Path Position ( $\alpha$ ) Flexion 90 + Pronation

(b) Flexion  $110^\circ$  + Midposition

**Swelling** Either side of triceps

### Therapeutic position

(1) Laborious ( $\alpha$ ) extension + pronation

(2) Left hand flexion 135 + pronation

(3) Aesthetic flexion 90° + midposition

(4) Writing flexion 90 + midway between midposition and pronation

(5) Feeding flexion 45° + midway between midposition and supination

- (3) **SYPHILIS** Secondary monarticular plastic arthritis and periarthritis  
(See under general joints)

(4) **TUBERCULOSIS**

Etiol Age 30 Years  
Senile struma

Path Origin (a) Osseous young  
(b) Synovial senile

Varieties (a) Pulpy synovial  
(b) Hydrops with malon-seeds

Clinic (1) Pain  
(2) Weak function  
(3) Swelling fusiform  
(4) Deformity flexion 120 + pronation  
(5) Palpation pulpy feel or fluctuation  
(6) Limited movements  
(7) Muscular wasting pronounced  
(8) Mensurations muscular wasting  
(9) Abscesses and sinuses  
(10) X Rays

Sequelæ (1) Abscesses and sinuses  
(2) Ankylosis fibrous  
(3) Bursitis

Treat

(A) **Conservative** Fixation  
In Optimum position  
By Plaster-of Paris  
For Three months after clinical cure

(B) **Operative**

Ind (a) Failure of conservatism  
(b) Complications  
(c) Adults

Tech (1) Arthrectomy before 17  
(2) Excision: after 17  
(3) Amputation

- (5) **LOOSE BODIES** Malon-seeds

(6) **OPERATIONS ON ELBOW JOINT**

(A) **Arthrotomy**

Ind (a) Drainage  
(b) Removal of loose bodies  
(c) Lavage

Incisions (a) External to olecranon

Counterincision (b) Inner side through the joint

Save Ulnar nerve

**(B) Exposure****(1) Lateral**

- (a) Incision 1.5 above the external condyle  
 ↓ External condyle  
 ↓ Radial head  
 ↓ 2 below the elbow joint
- (b) Division of extensor aponeuroses and capsule in the line of incision

**(2) Posterior**

- (a) Incision vertical posterior midline with centre at the olecranon tip down to the bone

**(C) Excision**

- Ind** (a) Compound comminuted fracture  
 (b) Tuberculosis  
 (c) Suppurative disorganization  
 (d) Persistent sinuses  
 (e) Ankylosis traumatic or infective

**Tech** (1) Incision posterior vertical

- (2) Peeling off the bones (a) Outer side tissues  
 (b) Inner side tissues

**(3) Bone section** gap of 1.5-2 inches

- (a) Humerus transverse through the middle of the internal epicondyle  
 (b) Forearm bones level of radial neck

**After-treat** 1st day fixation at right angles on metal splint

11th day assisted active movements

22nd day sling with flexion + physiotherapy

**Comp** (1) Ulnar nerve injury**(2) Flail joint**

- Causes** (a) Non-preservation of triceps insertion  
 (b) Treatment in extension

**Treat** (a) Reattachment of triceps to reformed olecranon

(b) Arthrodesis

(c) Elbow support apparatus

**(D) Arthroplasty**

**Ind** As in excision with

- (a) Skillful occupation  
 (b) Relatively healthy bones  
 (c) Small degree of painful movement

**Tech** (a) Incision posterior

- (b) Flap of deep fascia and aponeurosis from posterior forearm muscles with pedicle attached to inner humeral condyle

or Fascia lata flap

- (c) Bone section
    - (a) Move from humerus
    - (β) Save radius and ulna as much as possible
  - (d) Suture of the flap [U] over the humeral head
  - (e) Rearrangement of triceps tendon
    - (a) Z division + lengthening
    - or (β) Albee technic
- Piece of ulna with triceps insertion turned up and reattached at a higher level

After-treat Fixation

In Elbow flexion

By Plaster of Paris

Extent Metacarpal heads to axilla

For Three weeks

Active exercises and physiotherapy after three weeks

Compl (a) Flail elbow

(b) Ankylosis

(c) Excision of the radial head

Ind (a) Ankylosis of superior radio-ulnar joint

(b) Fracture head or neck of the radius

(c) Unreduced dislocation of radial head

Tech (1) Incision external condyle → radial head →

(2) Exposure of the joint

(3) Excision of the radial head

(4) Interposition of fascial graft

(5) Closure

After-treat 1st day (a) Fixation

In elbow at right angles

forearm supinated

By interrupted elbow splint

(b) Active finger exercises

22nd day Active voluntary movements

## (6) WRIST CARPAL AND CARPOMETACARPAL JOINTS:

### (A) TRAUMA

#### (1) Sprain of the wrist

Etio Falls or twists

Clinic (1) Pain + tenderness + effusion

(2) Negative X Ray

Diff. diag Fracture navicular

Treat (1) Strapping

or (2) Dorsal plaster cast

In Dorsiflexion

For Ten days

Compl (1) Traumatic tenosynovitis:

Site Thumb extensor

Clinic Pain + swelling + crepitus on movement



- Treat (a) Strapping  
or (b) Dorsal plaster cast  
In Dorsiflexion  
For Three-weeks
- (2) Tendo-vaginitis stenotans  
Site Thumb extensor  
Clinic (a) Pain half inch above radial styloid  
+ on adduction of the thumb  
(b) Hard palpable nodule  
Treat Longitudinal division by (a) tenotome  
(b) open operation
- (3) Peritendinous fibrosis:  
Site Extensors of the hand  
Clinic Circumscribed hard swellings  
Treat Dorsal plaster cast
- (2) Dislocation of wrist joint  
(A) Inferior radio-ulnar joint  
(B) Radio-carpal  
Path (a) Backwards  
(b) Forwards  
Clinic (a) Deformity  
(b) Normal styloid relationship  
Diff diag (1) Colles fracture  
(2) Separation of radial epiphysis  
(3) Sprain with synovitis  
(4) Fracture navicular  
(5) Dislocation of a carpal bone  
(C) Mid carpal Joint  
(D) Semilunar:
- Varieties (a) Retro-lunar dislocation of os magnum  
(b) Forward dislocation  
(c) Total dislocation  
Clinic (a) Deformity (a) Anterior projection  
(b) Posterior projection  
(b) Painful immobility of semiflexed fingers  
(c) Median nerve paralysis  
Compl (a) Fracture scaphoid  
(b) Avascular necrosis  
(c) Traumatic arthritis  
Treat (1) Manipulative reduction: With traction  
Hyper extension } + local pressure  
↓ Hyper flexion }  
(2) Operative reduction  
Ind Unreduced dislocation for 2 weeks  
Sequelæ (a) Avascular necrosis  
(b) Degenerative arthritis

**(3) Excision :**

- Ind (a) Total dislocation  
 (b) Failure of reduction  
 (c) Recurrence of dislocation  
 (d) Old unreduced dislocation

Tech Incision 2 inches along the medial side  
 of flexor carpi radialis

- After treat (1) Fixation  
 In Wrist  
 (a) Flexion 45° for one week  
 ↓ (b) Neutral position for two weeks  
 By Dorsal plaster cast  
 Extent Below elbow to metacarpal heads  
 For Three weeks (renewed after first week)  
 (2) Immediate finger exercises

**(E) Os Magnum**

- Path Backwards  
 Clinic Swelling under the extensor tendons  
 Treat (1) Reduction local pressure on flexed wrist  
 (2) Excision

**(F) Carpo-metacarpal joints**

- Site 2nd to 5th  
 Path Dorsal displacement of metacarpal bases  
 Diff diag Bennett's fracture (if thumb)  
 Treat (1) Traction with pressure  
 or (2) Open reduction if manipulations fail  
 After treat (1) Fixation  
 In Wrist dorsiflexed 45°  
 By Plaster-of Paris  
 Extent Metacarpal heads to below elbow  
 For Three weeks  
 (2) Finger exercises

**(B) ARTHRITIS OF THE WRIST**

- Path. position Slight flexion  
 Swelling (a) Under extensors  
 (b) Under flexors  
 Therapeutic position Dorsiflexion 45°

**(C) TUBERCULOSIS OF THE WRIST AND CARPAL JOINTS**

- Eti Age (a) Young adults  
 (b) Senile struma  
 Path Origin (a) Synovial  
 (b) Osseous  
 Radius 2nd or 3rd metacarpal  
 (c) Tendon sheaths



- (5) Extra-articular arthrodesis of wrist Logroschino  
Dorsal radial bone-graft across the joint from radius to metacarpal bones

## (7) METACARPO-PHALANGEAL AND INTER PHALANGEAL JOINTS:

### (A) TRAUMA

- (1) Thumb (or other metacarpo-phalangeal joints)

#### (A) Sprain of the thumb

Treat Firm strapping for 3 weeks

#### (B) Subluxation of the thumb

Path Rupture of the metacarpo-phalangeal lig

Clinic Lateral instability of the thumb

Treat Operative reduction

↓ Plaster fixation for 4 weeks

#### (C) Dislocation of metacarpo-phalangeal joint of the thumb

Path (a) Displacement phalanx back and out  
(b) Interposition glenoid ligament  
Flex. long poll.  
Sesamoid bones

Treat (1) Reduction By manipulations

Traction

↓ Hyperextension } of the joint  
↓ Sudden flexion }  
↓ Out pressure on metacarpus

#### (2) Posterior tenotomy of glenoid ligament

#### (3) Open reduction

(a) Posterior incision

(b) Lateral incision

After treat Fixation

In Moderate flexion

By Plaster-of Paris

For 3 weeks

- (2) Inter phalangeal joints

#### (A) Sprain

Treat Fixation

In Slight flexion

By Collodion gauze

For 3 weeks

**(B) Dislocation :**

Treat (a) Manipulative reduction

*Hyperextension*

↓ Traction

↓ Flexion

(b) Fixation

*In Flexion*

By Plaster

For 3 weeks

**(C) Fracture-dislocation**

Path (a) Chip fracture

(b) Condyle fracture

(c) Base fracture

Compl Recurrence of dislocation

Treat (1) As in Bennet's fracture-dislocation

(2) Continuous traction

**(B) ARTHRITIS****(1) Gonococcal arthritis**

(a) Affection of multiple joints with settlement in one or two

(b) History of urethral discharge

**(2) Rheumatoid arthritis :**

(a) Vasomotor signs

(b) Joint signs acute, subacute, chronic  
multiple joints

(c) General signs

(d) Sequelæ signs atrophy contractures  
deformities**(3) Osteoarthritis :** Metacarpo-phalangeal joint of the thumb**(4) Gout** Metacarpo-phalangeal joint of the thumb**(C) OPERATIONS ON THE JOINTS****(1) Open reduction of dislocations****(2) Arthroplasty of thumb joints :**

Ind (a) Impossible reduction

(b) Damaged cartilage

Tech Incisions (A) Trapezio-metacarpal

Between ext. pol. long. and ext. pol. brev.

(B) Metacarpo-phalangeal

Along the radial side of ext. pol. long.

After-treat (1) Extension : for two weeks

↓ (2) Movements

**(8) SACRO-ILIAC JOINT:****(A) TRAUMA****Sacro-iliac relaxation    subluxation or strain**

- Etio** (a) Traumatic  
           (b) Chronic strain  
           (c) Unduly mobile joints
- Path** (a) Forward inclination of the sacrum relative to ilium  
               (Upper end of sacrum forwards)  
       or (b) Perpendicular sacrum  
               (Upper end of sacrum backwards)
- Clinic** Pain + tenderness (a) Local  
                                  (b) Sciatic
- Treat** (1) **Conservative**  
               (a) Manipulations under anaesthesia  
               ↓ (b) Rest in bed for two weeks  
               ↓ (c) Strapping of pelvis  
       (2) **Pelvic belt** (Sacro-iliac support)  
               Ind Recurrence  
       (3) **Arthrodesis**  
               Ind Unduly mobile, weak, painful joint

**(B) INFECTIVE ARTHRITIS**

- Etio** Adolescents or adults  
       Influenza or other infections
- Clinic** (a) Signs of inflammation  
           (b) Radiography no bone changes  
           (c) No abscess or sinus
- Diff. diag.** (a) Traumatic joint  
               (b) Tuberculous joint  
               (c) Osteoarthritic joint

**(C) TUBERCULOSIS**

- Etio** Adults
- Path** Origin osseous
- Clinic** (1) Pain (a) Local  
                          (b) Sciatic  
       (2) Limping  
       (3) Tenderness (a) Local  
                          (b) On lateral pressure  
       (4) Boggly swelling (a) External  
                                  (b) Internal P R. or P V  
       (5) X Ray fluffy outline of bones + rarefaction
- Treat** (1) **Conservative** Plaster-of Paris fixation  
       (2) **Operative** (a) Aspiration of cold abscesses  
                          (b) Exposure and scraping  
                          (c) Arthrodesis

#### (D) OSTEOARTHRITIS

Clinic	(1)	Pain	(a)	Local
			(b)	Sciatic
	(2)	Limping		
	(3)	X Ray		osteophytes

### (E) OPERATIONS

### Arthrodesis

Ind T B.  
Osteoarthritis

(A) Intra-articular Smith Peterson

**Tech** (1) Incision Along posterior two-thirds of iliac crest  
 ↓ Round the posterior superior spine  
 ↓ Parallel to gluteus maximus  
 (2) Exposure and clearing the outer aspect of ilium  
 (3) Elevation of the joint  
 (4) Bone-graft from dorsum ili counter-sunk to seal socket  
 (5) Closure

(18) Extra-articular

	(1) Verrill's operation:
Preoper	Plaster bed
Oper	(a) Semilunar skin flap
	(b) Exposure of posterior superior skin flaps
	(c) Removal of sacral spines
	(d) Tunnel in ilium in front of posterior sacral spines
	(e) Tibial bone-graft insertion
	(2) Key's Arthrodesis
	(a) Gluteal incision midline towards greater trochanter
	(b) Reflection of origins of gluteal muscles
	(c) Exposure of the joint
	(d) Iliac graft between posterior superior spine and sacrospinous notch

After-treat (1) Plaster fixation for three months  
(2) Pelvic brace for one year more

### (9) HIP JOINT

(A) CONGENITAL

(1) CONGENITAL DISLOCATION OF THE HIP

**Etio** Heredity  
Girls (80%)  
Breech presentation thighs flexed and adducted

**Cause** (1) Intrauterine breech presentation  
↓  
Thighs flexed and adducted  
↓  
Flat acetabulum  
or (2) Lack of development of iliac part of acetabulum

- ↓ Congenital subluxation  
 ↓ Exaggeration by weight bearing

Path Varieties (1) Posterior Dorsum ili

- (a) Postero-dorsal  
 (b) Marginal  
 (c) Vertical

(2) Anterior below ant. sup. iliac spine

Morb. anat Nature of changes (a) Congenital  
 (b) Accommodative  
 (c) Wear and tear

(1) Femoral head

- (a) Alteration in shape  
 (b) Alteration in level  
 (c) Displacement  
     (1) Upwards shortening of the limb  
     (2) Backwards lordosis  
     (3) Outwards rolling gait

(2) Femoral neck (a) Alteration in angle  
                     Coxa vara  
                     (b) Anteversion 35° to 90°

(3) Trochanter major elevation

(4) Acetabulum (a) Flat  
                     (b) Deficient iliac part

(5) Dorsum ili false acetabulum

(6) Capsule hourglass contraction

(7) Ligaments : contractures

(8) Compensatory (a) Lordosis or scoliosis  
                     (b) Genu valgum

Clinic

(A) Predislocation stage 3 or 4 weeks after birth

- (a) When the child is made to sit up, it falls sideways  
 (b) Hip joint resists abduction beyond 45  
 (c) Absence of head in the groin  
 (d) Eversion of the leg  
 (e) Asymmetry of the waist, nates and thighs  
 (f) X Ray flat socket

(B) Dislocation stage

(1) Symptoms limp with waddling or scissor gait

(2) Inspection

- (a) Spinal deformity (a) Scoliosis  
                             (β) Lordosis  
 (b) Hip deformity flexion + adduction  
 (c) Trochanter elevation  
 (d) Knee knock knee  
 (e) Leg shortening



- (f) Perineum broadening
- (g) Line of the body
  - Line of trunk anterior to the front of thigh
- (3) Palpation
  - (a) Loss of resistance in the Scarpa
  - (b) Femoral head on dorsum ilii
  - (c) Great trochanter elevated prominent
- (4) Movements
  - (a) Restriction of
    - (a) Extension
    - (β) Abduction
    - (γ) Rotation
  - (b) Exaggeration of
    - (a) Adduction
    - (β) Flexion
  - (c) Presence of telescopic movements
- (5) Measurements
  - (a) Shortening of the limb
    - Ant. sup. spine to medial malleolus
  - (b) Elevation of trochanter
    - (1) Nelaton's line
    - (2) Bryant's triangle
    - (3) Shoemaker's line
    - (4) Chiene's parallels
    - (5) Morris bitrochanteric test
    - (6) Trendelenburg test
      - Standing on affected leg
      - ↓ Lowering of pelvis on sound side
- (6) X Rays
  - (a) Shape of acetabulum
  - (b) Shape and position of femoral head
  - (c) Neck
    - (a) Coxa vara with anteversion
    - (β) Interruption of Shenton's line
    - (γ) Abnormal epiphysial centre

- Diff diag
- (1) Acute arthritis
  - (2) Infantile paralysis
  - (3) Pseudo-hypertrophic muscular paralysis
  - (4) Rickety deformities

#### Treatment

- (1) Predislocation stage age 3 to 4 weeks
  - Braur's treatment Retentive apparatus
  - + Active movements

- (a) Hips maintained in full abduction by braces
- (b) All movements allowed except Adduction and extension

(2) Reduction stage age 1-3 years

- (a) Manipulative reduction
- + (b) Plaster-of Paris in corrected position

(A) Putti

Ind Upto twelve months

Tech (1) Gradual forcing of the lower limb into

(a) Maximum abduction

+ (b) Inversion

(2) Fixation by 'broad-arrow perineal splint for 8 to 12 months

(3) Daily passive movements

(B) Lorenz

Ind Ideal Below three years

Unilateral Below nine years

Bilateral Below six years

Tech (1) General anaesthesia

(2) Passive stretching of Flexors, extensors, adductors

(3) Reduction

(a) Abduction of flexed thigh

(Over a cushion behind the trochanter)

or (b) Traction away from the joint

with Thigh fully flexed + adducted + inverted  
Reduction is shown by

(a) Click

(b) Head felt in scarpa

(c) Tense hamstrings

(4) Stretching of adductors and capsule

(5) Fixation

In (A) Lorenz position

(a) Right angled abduction 90 + 90

+ (b) Eversion

(B) 'Knee in the axilla' position

(C) Lange position

(a) Right angled abduction 90 + 90

+ (b) Inversion

(D) Neutral position

Different positions

(A) Hip (a) 90° + 70°

(b) 90° + 90°

(c) Knee in axilla

- (B) Patella (a) Looking out Lorenz  
 (b) Looking in Lange  
 (c) Looking front neutral  
 (C) Knee flexion 90°

By Plaster-of Paris

Extent Lower part of the chest  
 ↓ Affected ankle + upper opposite thigh

For 6 to 10 months  
 (Leg and knee for 2 months)

At 3 monthly renewals

(6) Locomotion and weight bearing

(A) Early (a) Unilateral 2-4 weeks  
 (b) Bilateral 8 weeks

(B) Late

(a) Plaster fixation for 6 to 10 months

↓ (b) Night splint  
 with  
 Massage and exercises } for 6 months

↓ (c) Walking 12 to 18 months after reduction

(C) Average time for walking 2 to 10 months

(3) Open operation stage

- (1) Age 3 to 6 years
- (2) Mechanical hindrance to reduction
- (3) Acetabular defect (recurrence after reduction)

- Ind (1) Hourglass contracture of the capsule  
 (2) Reinforcement of acetabular lip  
 (3) Reconstruction of acetabulum

(A) Open reduction :

- Ind (a) Age 3-6 years  
 (b) Failure of closed reduction

Preoper 3 weeks before

- (a) Weight extension in abduction  
 (b) Stretching and manipulations of adductors  
 or (c) Tenotomy of adductors

- Operation (1) Incision Smith-Peterson  
 (2) Vertical incision of capsule  
 (3) Reduction of dislocation  
 (4) Horizontal sowing of capsule

Post-oper Fixation  
 In Abduction  
 By Plaster-of Paris  
 For 6 months

**(B) Acetabular reconstruction**

Ind (a) Relapse after reduction in a child under 6 years

(b) Marginal dislocation in a child from 3 to 6 years

**(1) Shelf operation**

(A) Fairbank Dorsum ilii graft

(B) Albee Ilium split with gap-fill graft

**(2) Reconstruction operation Colonna**

Ind Age over 6 years

Proper (a) Manipulative mobilization under anaesthesia

(b) Division of adductor tendons

(c) Weight traction 10-15 lbs.

For (a) Three weeks

(b) Till X Ray evidence of head opposite the acetabulum

Tech (1) Incision along the iliac crest

↓ greater trochanter

↓ down and back

(2) Reflection of trochanteric tip

(3) Division of hourglass contraction of capsule

(4) Hollowing out the acetabulum

(5) Placing the femoral head in acetabulum

(6) Reattachment of trochanteric tip

After-treat Plaster spica in moderate abduction

**(4) Late palliative stage (a) Age above 9 years**

(b) Painful osteoarthritis

**(A) Anterior conversion**

Ind Age 9 to 18 years

Tech Stage one

Adductor tenotomy + Skeletal traction

Stage two

(1) Hyperextension + abduction hip

↓ (2) Plaster fixation for six months

**(B) Anteversion of neck**

Subtrochanteric osteotomy

**(C) Abduction contracture**

(a) Subtrochanteric osteotomy

(b) Open capsulotomy

**(D) Late painful unreduced cases**

(1) Excision of femoral head

↓ Fixation

In Extension and abduction

By Plaster-of Paris

For Three months

## (2) Arthrodesis of the hip

## (3) Lorenz's bifurcation osteotomy:

- Tech (a) Incision below the great trochanter  
 (b) Osteotomy below trochanter minor  
 (c) Shaft levered inwards into empty socket

## After-treat (a) Fixation

In Abduction + slight inversion  
 femur

Flexion of the knee

By: Plaster of Paris

For 3 months

With Walking at the end of 3 weeks

(b) Physiotherapy and exercises

- Complications (1) Pseudo-coxalgia  
 (2) Osteoarthritis  
 (3) Instability  
 (4) Ankylosis  
 (5) Pain  
 (6) Recurrence

## (2) Congenital protrusio acetabuli

Path Irregular enlargement of acetabulum  
 + Femoral head deeply buried

- Clinic (a) Limited hip movements  
 (b) Flexion of the hip  
 (c) Forward tilt of the pelvis  
 (d) Lordosis

- Signs (a) Interruption of Shenton's line  
 (b) Short limb

- Compl (a) Vulnerability to injury  
 (b) Osteoarthritis

- Treat (a) Manipulations → weight extension  
 (b) Smith-Petersen acetabuloplasty

## (B) TRAUMA

## TRAUMATIC DISLOCATION OF THE HIP

- Etio (1) Falls from great height in young musculars  
 (2) Dash-board motor accidents  
 (3) Falling roof  
 (4) Excessive traction for fracture femur

- Etio varieties (1) Abduction dislocations

## (A) Posterior:

Abduction of flexed and inverted femur

## (B) Anterior

Abduction of extended and everted femur

## (2) Adduction dislocation

Dorsal dislocation + fracture acetabular rim

Anat. varieties (1) Irregular Torn Bigelow → recurrence

(2) Regular

(A) Posterior

(a) Dorsal Above obturator int.  
50 %

(b) Sciatic Below obturator int.  
25 %

(B) Anterior

(a) Obturator Upon obturator ext.  
15 %

(b) Pubic Upon pubic ramus  
10 %

(C) Central Fracture acetabular floor  
Femoral head in pelvis

# Clinic

(A) Posterior

(1) Dorsal

(a) Decubitus

(1) Thigh adduction + inversion +  
flexion  
Crosses above the other knee

(2) Great toe on dorsum foot

(b) Locking of the hip

In Adduction + inversion + flexion

(c) Shortening of inferior extremity

(d) Local exam

(1) Elevation of trochanter

(2) Relaxation of ilio-tibial band

(3) Displaced femoral head

(a) Absence from scarpa

(β) Presence over dorsum ilii

(e) Scatica

(2) Sciatic Same as in dorsal but less exaggerated

(a) Thigh crosses at the other knee

(b) Great toe at the root of the other great toe

(c) Less shortening

(B) Anterior

(1) Obturator

(a) Decubitus

Abduction + eversion + extension

(b) Locking of the hip

In Abduction + eversion + extension

( ) Lengthening of inferior extremity

(d) Local examination

Femoral head on obturator externus

(e) Obturator neuralgia

- (2) Pubic Same as in obturator but
- (a) Shortening of inferior extremity
  - (b) Femoral head on pubic ramus
  - (c) Great trochanter replaced by depression
  - (d) Femoral neuralgia

(C) Central

- (1) Absolute immobility of hip joint
- (2) Shortening of the inferior extremity
- (3) Rectal examination
- (4) X Rays Ilio-pectineal line tilted inwards

- (D) Irregular
- (a) Freer excursions
  - (b) Easy reduction
  - (c) Easy recurrence

Compl (1) Abnormal dislocation

- (a) Fracture-dislocation fractures of
    - (1) Acetabulum
    - (2) Femoral head
    - (3) Femoral neck
    - (4) Femoral trochanters
    - (5) Femoral upper shaft
  - (b) Unreduced dislocation
  - (c) Recurrent dislocation
  - (d) Complicated dislocation sciatica  
sciatic paralysis
- (2) Avascular necrosis of femoral head:
- (a) Complete disintegration
  - (b) Degenerative osteoarthritis
  - (c) Epiphyseal coxa plana
- (3) Myositis ossificans

Treatment

(A) Recent dislocations

- (1) Manipulative reduction
- or (2) Traction reduction
- (1) Posterior dislocation
  - (I) (a) Deep anaesthesia
  - (b) Fix the pelvis
  - (c) Manipulations  
Bigelow manipulations  
Flexion of the hip and knee  
↓ Adduction + inversion of thigh  
↓ Quick external circumduction +  
extension  
i.e. (a) Lift up + bend in + roll in  
↓ (b) Circle out + straighten

- or (d) Direct traction on limb with hip at right angle
- or (II) Weight traction in the axis of displaced femur
- (2) Anterior dislocation :
  - (1) (a) Deep anaesthesia
  - (b) Fix the pelvis
  - (c) Manipulations
    - Flexion in abduction
    - ↓ Internal circumduction + extension
    - i.e. (1) Lift up + bend out + roll out
    - ↓ (2) Circle in + straighten
  - or (d) Manual traction with hip at right angle
- or (II) Weight traction in the axis of displaced femur

#### After treat

- (1) Legs tied together for 10 days
  - Massage immediate
  - Pass. move 10-14 days
  - Act. move 21-30 days
  - Weight bearing 45-60 days
- or (2) Fixation
  - In Extension + slight abduction + neutral rotation
  - By Plaster-of Paris spica
  - Extent : Thorax to lower leg
  - For Two months
  - With Exercises of quadriceps + toes + ankle
- (3) Central dislocation
  - (1) Skeletal traction
    - In Abduction
    - By Tibial tubercle pin
    - With Braun's splint
    - For Two months
  - (2) Operative reduction
    - Through midline suprapubic incision
- (B) Old unreduced dislocations
  - (1) Osteotomy
  - (2) Arthrodesis
- (1) Trochanteric osteotomy :
  - Ind (a) Shortening less than one inch
  - (b) No sciatic pressure



- (2) Open reduction } two stage operation  
 ↓ Arthrodesis

Ind (a) Shortening more than one inch  
 (b) Sciatic pressure  
 (c) Osteoarthritis

### (C) ACUTE ARTHRITIS

Path. position (a) Flexion 40  
 (b) Abduction 40  
 (c) Eversion

Swelling Scarpa's triangle

Therapeutic position

(a) Flexion 20-30  
 (b) Slight abduction 20  
 (c) Neutral rotation or slight eversion

Causes (1) Pyococcal osteomyelitis neck of the femur  
 (2) Pneumococcal  
 (3) Typhoid

### (D) TUBERCULOSIS OF THE HIP

Eti Before 20 5-20

Path Origin Osseous

(1) Intra-articular femoral neck metaphysis

↓ Synovial membrane

↓ Femoral head

↓ Acetabulum

(2) Acetabulum

Morb. anat (1) Wandering acetabulum  
 (2) Flattened femoral head  
 (3) Pathological dorsal dislocation  
 (4) Tuberculous debris  
 (a) Intra-articular  
 (b) Extra-articular  
 (a) Antero-external  
 (β) Gluteal  
 (γ) Pelvic

Stages (1) T B synovitis with effusion  
 Capacity posture

(2) Involvement of articular surfaces with  
 muscle spasm  
 Spasm posture

(3) Articular disorganization  
 Dislocation posture

(4) Ankylosis  
 Ankylosis posture

## Clinic

- (1) History of neglected injury
- (2) Limping Painful
- (3) Pain
  - (a) Local
  - (b) Referred to knee
    - (a) Continuous distension
    - (b) On weight bearing pressure
    - (r) Starting friction of raw bones
- (4) Tenderness On hammering the sole
- (5) Deformity
  - (A) Stage of effusion : capacity posture
    - (1) Flexion masked by lordosis  
Thomas sign
    - (2) Abduction masked by scoliosis
 

(a) Lumbar convexity	}	to affected side
(b) Dorsal concavity		
    - (3) Apparent lengthening masked by scoliosis
    - (4) Eversion
  - (B) Stage of muscle spasm : spasm posture
    - (1) Flexion masked by lordosis
    - (2) Adduction masked by scoliosis
 

(a) Lumbar concavity	}	to affected side
(b) Dorsal convexity		
    - (3) Apparent shortening masked by scoliosis
    - (4) Inversion
  - (C) Stage of articular disorganization  
Dislocation posture
    - (1) Flexion masked by lordosis
    - (2) Adduction masked by scoliosis
    - (3) Real shortening : masked by scoliosis
    - (4) Inversion
  - (D) Stage of ankylosis : ankylosis posture
    - (1) Pathological posture as in (C)
    - (2) Therapeutic posture optimum post.
- (6) Limitation of movements In all directions
  - (a) Flexion bend the thigh
  - (b) Extension prone → raise the thigh by leg
  - (c) Abduction
  - (d) Adduction

}	from midline
---	--------------

  - (a) Affected thigh cannot cross the middle of the sound thigh
  - (b) No tailor s position possible

- (a) Inversion { (1) Flex hip and knee and  
 (2) rotate by leg  
 (b) Eversion { (2) Extend and roll the  
 limb

- (7) **Swelling** Disappearance of groin fold  
 (8) **Muscular wasting** Disappearance of gluteal fold

(9) **Mensuration**

- (a) Int. malleolus to umbilicus:  
 Apparent shortening  
 (b) Int. malleolus to ant. sup. iliac spine  
 Real shortening  
 (c) Trochanteric measurements  
 (1) Nelaton's line  
 (2) Bryant triangle  
 (3) Chiene's parallels  
 (4) Shoemaker's lines  
 (5) Morris bitrochanteric measurements  
 Distance to midline  
 (More on affected side in path, dist.)

- (d) Round the thigh (for wasting)

- (10) **Trendelenburg's test + gait**  
 (11) **Rectal examination**  
 (12) **General health or other T B. focus**

**Complications**

(1) **Cold abscesses**

(A) **External**

- (a) Lateral  
 (b) Posterior  
 (c) Anterior

(B) **Internal**

- (a) Iliac fossa  
 (b) Pelvirectal  
 (c) Ischiorectal

(2) **Sinuses**

(3) **Deformities** Pathological dislocation

- (a) Flexion + adduction + inversion  
 + shortening

- + (b) Lordosis and scoliosis

**Diff. diag**

(1) **Other types of arthritis :**

- (a) Congenital dislocation  
 (b) Traumatic arthritis

- (c) Infective arthritis
- (d) Osteoarthritis
- (e) Hysterical arthritis
- (2) Bone conditions
  - (a) Pseudo coxalgia
  - (b) Slipped epiphysis
  - (c) Gummatous epiphysitis
  - (d) Acute osteomyelitis
  - (e) Coxa vara
  - (f) New growths
- (3) Bursitis Subscap or subgluteal
- (4) Psoas abscess
- (5) Spinal disease
- (6) Sacro-iliac disease
- (7) Sciatica

## Treat

## (A) Conservative

- (1) Weight extension in line of deformity
- ↓ (2) Weight extension in line of correct position
- ↓ (3) Plaster of Paris spica
  - In Correct position
  - For Three months after clinical cure
- ↓ (4) Thomas hip splint with crutches + patten
- ↓ (5) Gradual weight bearing
  - Ind (1) One year after clinical cure
  - (2) Bony union as shown by X Rays

## (B) Operative

- Ind (1) Adult age
- (2) Failure of one year of conservatism
- (3) Relapse
- (4) Sequestra
- (5) Quiescent stage

## Operations

- (1) Extra-articular arthrodesis
  - Ind (a) Early cases + adults
  - (b) Quiescent stage with slow recovery
  - (c) Help to conservative treatment
  - (d) Failure of conservative treatment
  - (e) Destruction of articular cartilage
  - (f) No gross bone lesion
- (2) Excision of the joint
  - ↓ Arthrodesis in abduction
  - ↓ Subtrochanteric osteotomy
- (3) Disarticulation
- (4) Subtrochanteric osteotomy :
  - Ind Mal-ankylosis

- Post. compl (1) Tuberculous meningitis  
 (2) Amyloid disease  
 (3) Sinuses  
 (4) Secondary sepsis

## (E) OSTEOARTHRITIS OF THE HIP

### Morbus coxae senilis

Etio Middle and later life

Causes (A) Local

- (1) Previous trauma
- (2) Infantile nutritional diseases
- (3) Congenital dislocation and its forcible manipulation treatment
- (4) Osteochondritis dissecans  
Avascular necrosis
- (5) Subacute infections
- (6) Zymotic affections

(B) General

- (1) Toxaemia from local sepsis
- (2) Neurogenic

Path (See under Osteoarthritis)

- Clinic (1) Painful limping  
 (2) Crepitant and restricted painful movements  
     (a) Flexion  
     (b) Abduction  
 (3) Limb adducted + everted or inverted  
 (4) Trochanter elevated  
 (5) Muscles wasted  
 (6) Sciatica

Treat (1) Early cases

(A) Conservative

- (1) Remove the primary focus
- (2) Treat the etiology
- (3) Local positional  
     ↓ protective apparatus  
     ↓ physiotherapy

(B) Camitz treatment

- (1) Midline extraperitoneal obturator neurectomy  
     ↓ (2) Manipulations and tenotomy of adductors

(2) Late cases :

(A) Manipulations under anaesthesia :

Ind Pain not persistent

(B) Rest Walking plaster spica



## (B) Antero-external approach (Smith-Petersen)

Ind Open reduction of congenital hip dislocation in child

- Tech (1) Incision (a) As in (A)  
           + (b) Three inches along the iliac crest  
 (2) Strip tensor fasciae and glutei from film  
 (3) Detach straight head of rectus

## (C) Lateral approach:

- Ind (1) Extra-articular arthrodesis  
 (2) Intra-articular arthrodesis  
 (3) Arthroplasty

Tech

- (1) Spino-trochantero-femoral incision:  
 (a) Incision anterior superior spine  
       ↓ trochanter major  
       ↓ along femoral shaft  
 (b) Dissect between (a) Tensor fasciae  
                           & (b) Glutei  
 (c) Division of the great trochanter  
 (2) Murphy's Goblet incision  
 (a) Incision (a) Cup with trochanter as bottom  
               (b) Handle along the femoral shaft  
       Other steps as in (1)

## (D) Posterior approach

Ind Reconstructive operations

- Tech (1) Incision (a) Tip of the great trochanter  
                   ↓ towards posterior superior iliac spine  
               + (b) Tip of the great trochanter  
                   ↓ along femoral shaft  
 (2) Gluteus maximus split  
 (3) Dissection between (a) Deeper glutei  
                           & (b) Piriformis  
 (4) Division of great trochanter with muscle insertion

## (2) Excision of the hip:

- Ind: (a) Traumatic destruction of the joint  
 (b) Pathological dislocation  
 (c) Tuberculosis  
 (d) Ankylosis of the hip with thigh amputation

Tech

- (1) Exposure of the joint  
 (2) Capsulotomy  
 (3) Excision of the affected constituent bones  
 (4) Arthroplasty or arthrodesis  
 (5) Closure

## (E) Arthroplasty of the hip:

- Ind (1) Bilateral ankylosis of the hip  
 (2) Painful limited movements: osteoarthritis  
 (3) Infective or tuberculous ankylosis

- Tech (1) Incision (a) Antero-lateral  
or (b) Murphy's goblet
- Method (A) Classical (a) Remodelling of acetabulum  
(b) Remodelling of head  
(c) Interposition of fascia lata
- (B) Whitman  
Ind (a) Arthritis osteoarthritis  
(b) Non-united neck fracture  
Tech (a) Removal of head of femur  
(b) Pushing the neck into acetabulum  
(c) Trochanter transferred lower down
- (C) Colonna  
Ind Non-united neck fracture  
Tech (a) Removal of head  
(b) Use of trochanter or head of femur  
(c) Reinsertion of trochanteric muscles lower down
- (D) Smith-Peterson's Vliedum mould arthroplasty  
Ind Mal-ankylosis of the hip
- (E) Smith-Peterson's acetabuloplasty  
Ind (a) Protrusion acetabuli  
(b) Senile osteoarthritis  
(c) Slipped epiphysis  
Tech (1) Incision anterior third of iliac crest  
↓ along sartorius  
(2) Muscle split (a) Sartorius + iliopsoas  
from (b) Tensor fasciae  
(3) Division of straight head of rectus  
(4) Exposure of capsule  
(5) Excision of superior acetabular edge and  
V shaped capsule

After-treat Abduction and inversion for 3 weeks

#### (4) Arthrodesis of the Hip

- Ind (1) Painful unilateral hypertrophic osteoarthritis  
(2) Paralysis of all hip muscles  
(3) Tuberculosis of the hip

Proper Plaster bed lower thoracic margin  
↓ whole of inferior extremity  
& opposite knee

#### Operation

##### (A) Intra-articular

##### (1) Albee's open method :

Tibial graft into the tunnel in the neck  
through anterior incision

##### (2) Smith-Peterson pin closed method :

Fixation by long and strong pin through the  
neck into the head and acetabulum



**(B) Extra-articular For T.B hip**

Formation of a bridge of bone between femur and ilium to prevent movements at the hip joint

Tech (1) Lateral approach

(2) Methods

(A) Shelf operation Mathieu

Shelf of bone from ilium turned down to trochanter major

(B) Trochanter graft Hibb

Part of greater trochanter separated, rotated and contacted with dorsum ilii

(C) Femoral or tibial graft

(a) Between dorsum ilii and greater trochanter (Hay groves)

(β) Between ischium and greater trochanter (Trumble)

After treatment of hip operations

(A) Arthrodesis

Fixation

In Optimum position

Flexion  $20^{\circ}$ - $30^{\circ}$

Abduction slight ( $20^{\circ}$ )

Everson slight

By Plaster-of Paris

Extent Lower edge of the thorax

↓  
Toes

↓  
Opposite ant. sup. spine

↓  
6 of opposite thigh (for 3 weeks)

After 10 days

For 3 months

(B) Arthroplasty:

(1) Classical:

1st day (a) Extension to the leg 20 lbs.

+ (b) Plaster spica from ribs to ankle over (a)

10th day Bivalve the plaster

Active movements

7th week Weight bearing

(2) Whitman

(a) Fixation

In Optimum position

By Plaster-of Paris

For 6 weeks

↓ (b) Assisted active movements  
(abduction + extension)

(3) If repeated access to wound is required

Fixation

In Optimum position

By Thomas abduction frame

After any operation on hip joint wear walking  
caliper for some months after operation before  
full weight is taken on the limb

## (10) KNEE JOINT:

(A) CONGENITAL (1) Dislocation of the patella  
(2) Abnormal ext. semilunar cart.

(B) TRAUMA

(I) Spram Traumatic synovitis

Rest + cold → strap + counter irritant  
(See under internal derangement)

(II) Dislocation

(A) Knee joint:

Varies (1) Lateral Traumatic subluxation

(2) Forward

Associated with rupture of ant. crucial lig

(3) Backwards

Associated with rupture of post. crucial lig

(4) Triple Flexion

+Eversion

+Backward subluxation

Cause Pathological disorganization

Compl Pressure on popliteal vessels

↓ Gangrene leg

Treat (1) Manipulative reduction

Flexion + traction + manipulations

↓ (2) Fixation

In Optimum position

For Three weeks

↓ (3) Active movements after 3 weeks

↓ (4) Weight bearing after 6 weeks

↓ (5) Knee brace for 6 months

(B) Patella

Etio (1) Congenital

(2) Direct traumatic

(3) Muscular violence in genu valgum

(4) Rupture of patellar ligament

(5) Hypotonic quadriceps

(6) Loose capsule

- Varieties** (A) Outwards Lateral  
 (B) Inwards Medial  
 (C) Rotatory  
 (D) Habitual slip
- Clinic** (1) Broadening of the knee joint  
 (2) Patella in abnormal position  
 (3) Intercondyloid notch palpable  
 (4) Joint effusion
- Compl** (1) Recurrence  
 (2) Osteoarthritis
- Treat** (1) **Manipulative reduction**  
 Flexion of the hip  
 + Extension of the knee  
 + Local manipulations  
 ↓ Fixation  
 In Optimum position  
 By Posterior splint  
 For Two months
- Operative:**  
 Ind (a) Pathological dislocation  
 (b) Recurrent or habitual dislocation
- Operation**  
 (A) Lateral  
 (a) Excision of capsular ellipse  
 (b) Robert Jones  
 Transplantation of tibial tubercle with ligamentum patellae to the inner side + plication of inner side of the capsule  
 (c) Albee Raising a ridge on outer femoral condyle  
 (d) Fixation of patella to inner side by fascial graft  
 (e) Transplantation of semitendinosus into the patella  
 (f) Transplantation of lateral half of the patellar tendon behind the medial half into the tibia, on inner side (Goldthwait)  
 (g) Elmslie  
 Robert Jones opn. + suturing a portion of vastus medialis around the quadriceps above the patella
- (B) Medial  
 (a) Insertion of iliotibial band into the outer edge of patella  
 (b) Plication or semilunar excision of outer part of the capsule
- (C) Secondary to genu valgum  
 Femoral supracondylar osteotomy
- After-treat:** (of operative treatment for dislocation patella)

- (1) Immobilisation in plaster for 8 weeks
- (2) Physiotherapy and movements
  - (a) Quadriceps drill immediate
  - (b) Walking after 4 weeks
  - (c) Knee flexion after 8 weeks
- (3) Palliative (a) Permanent knee truss or crepe bandage  
+ (b) Quadriceps drill

### (III) Fracture-dislocations

Dislocation of the knee associated with fractures

- (a) T or Y condylar femoral
- (b) Patella
- (c) Tibial tuberosities and spine

### (IV) Internal derangements of the knee

Def Intra-articular lesions due to trauma in a previously healthy knee joint, rendering it liable to recurrent attacks of sudden pain + synovial effusion

Eti Predisposers

#### (A) Anatomical

- (a) Inward angling  
↓ Asymmetric weight bearing
- (b) Flat and loose articulation
- (c) Tension on cruciate ligaments
- (d) Redundancy of synovial mem.
- (e) Localisations in the joint
- (f) Semilunar cartilages

#### (B) Sports and outdoor occupations

Exciting cause A strain or a twist

Varieties

#### (1) Traumatic synovitis and hæmarthrosis

##### (A) Traumatic synovitis

Eti Strain or twist

Clinic Synovial effusion

Treat (a) Mild crepe bandage with Scott's ointment

(b) Severe (a) Fixation

In Optimum position

By Back splint

For Ten days

↓ (β) Crepe bandage with Scott

↓ (γ) After treatment

Massage  
 Quadriceps drill  
 Weight bearing

} immediate

after 3 weeks

**(B) Recurrent synovitis**

- Etio** (a) Nipped synovial fringes due to  
           (α) Quadriceps inefficiency  
           (β) Synovial oedema  
           (γ) Osteoarthritis

**Clinic** : Recurrent painful effusion

- Diff. diag** (a) Semilunar cartilage injury  
               (b) T. B. synovitis  
               (c) Syphilitic synovitis

**Treat** Conservative with quadriceps drill

**(C) Traumatic hæmarthrosis**

- Etio** (a) Blow or twist  
           (b) Fracture tibial spine or patella  
           (c) Post-operative

**Clinic** Rapid effusion with local and general inflammatory reaction

- Treat** (1) Aspiration  
           ↓ (2) Crepe bandage with back splint  
           ↓ (3) Quadriceps drill after 10 days

**(2) Trauma to lateral ligaments of the knee****(A) Sprain of internal lateral ligament**

- Etio** (1) Abduction of extended or slightly flexed knee  
           (2) Abduction and eversion of leg over thigh

- Path** Tear of (a) Femoral attachment  
                   (b) Tibial attachment  
                   (c) Semilunar deep attachment

- Clinic** (1) Local  
           Pain + tenderness + swelling + ecchymosis  
           (2) Effusion into the joint

**Diff. diag** Semilunar cartilage tear

- Treat** (A) (a) Aspiration  
               + (b) Hinged knee support

**(B) Fixation**

**In** Optimum position

**By** Plaster cast

**Extent** Top of the thigh to ankle

**For** Three weeks

- ↓ (C) (a) Crepe bandage  
           + (b) Quadriceps drill  
           + (c) Sole elevation medial and heel

**(B) Rupture or avulsion of internal lateral lig. :**

**As in sprain**

+ Excessive lateral mobility (20 -30° of abduction)

**Treat (1) (a) Fixation**

In Optimum position

By Plaster of Paris

Extent Top of the thigh to ankle

For 8 weeks

(b) Quadriceps drill

**(2) Operative reconstruction**

Ind Persistent lateral instability inspite of three months quadriceps drill

Operations (1) Suture of the rupture  
 (2) Shortening of lax ligament  
 (3) Tenodesis by semitendinosus

After treat (a) Fixation in plaster for one month

+ (b) Quadriceps drill

↓ (c) Sole elevation medial side

**Compl Stield's disease**

Traumatic subperiosteal ossification at the femoral attachment

**(C) Sprain, rupture or avulsion of ext. lateral lig.**

(As in internal ligament substituting adduction for abduction and sole elevation on lateral side)

**(D) Ext. lateral lig. trauma + frac. fibular styloid**

Eto Severe adduction at knee

Path (1) Avulsion of external lateral ligament

+ (2) Avulsion of fibular styloid

+ (3) External popliteal nerve palsy

Treat Open suture

**(3) Injuries of the cruciate ligaments****(A) Anterior cruciate ligament**

Anat Tibial spine to external femoral condyle

Etio (a) Hyper abduction

(b) Hyper extension

Clinic Excessive forward mobility of tibia over femur when knee is extended

**(B) Posterior cruciate ligament**

Anat Tibial spine to internal femoral condyle

Etio Blow over the front of the tibial head

Clinic Excessive backward mobility of tibia over femur when knee is flexed

Treat (Of cruciate ligament injuries)

(1) **Conservative**(A) **Fixation**

- In (a) Anterior ligament  
Knee flexed to 40  
Tibial head backwards  
(b) Posterior ligament  
Knee extended  
Tibial head forwards

By Plaster-of Paris

Extent Toes to groin

For Three months

- (B) Quadriceps drill, immediate  
+ Ambulation with crutches and patten

(2) **Operative reconstruction : By fascia lata**

Ind Failure of conservative treatment

- Tech (a) Good exposure  
(b) Drilling of femur and tibia  
(c) Fascial strip

After-treat (1) Fixation

In Knee in 160°

By Plaster-of Paris

For 6 weeks

↓ (2) Physiotherapy and knee cage

(4) **Fracture of tibial spine**

Eti 10-20 years

- Cause (a) Hyperabduction  
(b) Hyperextension  
(c) Blow to the front of flexed knee driving th femur back

Path Associated with rupture of ant. cruciate lig

- Clinic (1) Rapid hæmarthrosis  
(2) Forward mobility of tibia  
(3) Limitation of terminal 15° of extension  
(4) X Rays

- Treat (1) Manipulative reduction  
(2) Open reduction

Tech Incision outer side of lig patellæ  
↓ Division of ant. horn of ext. semilunar  
↓ Reposition of fragment

After treat (A) **Fixation**

In Extension

By Plaster-of Paris

For Six weeks

+ (B) Quadriceps drill

(C) ... (D) ... (E) ... (F) ... (G) ... (H) ... (I) ... (J) ... (K) ... (L) ... (M) ... (N) ... (O) ... (P) ... (Q) ... (R) ... (S) ... (T) ... (U) ... (V) ... (W) ... (X) ... (Y) ... (Z) ...

## (6) Semilunar cartilage abnormalities

## (A) Congenital

- Varieties { (1) Disc cartilage (external)  
 (2) Irregular thick fibrocartilage (external)
- Clinic { (1) History of knee trouble from childhood  
 (2) Snap on the outer side of the joint during extension, heard and felt
- Treat Removal of the cartilage

## (B) Tears of the semilunar cartilages

- Eti (1) Internal Weight bearing external rotation and abduction of tibia in a flexed knee  
 (2) External Weight bearing internal rotation and adduction of tibia in a flexed knee
- Predis (a) Undue laxity of cartilages  
 (b) Footballers miners, carpet layers
- Frequency Internal External 8 1
- Path Varieties (1) Central displacement with locking  
 Longitudinal (a) Bucket handle  
 (b) Peripheral  
 (2) Non locking  
 (a) Posterior horn tears  
 (b) Central tears  
 (c) Anterior horn tears

## Clinic

## (1) Internal semilunar cartilage

## (A) Bucket handle tear with locking

- (a) Immediate  
 (1) History of abduction eversion strain  
 (2) Sickening tearing pain on inner side  
 (3) Locking in semiflexed position
- ↓ (b) Intermediate  
 (4) Synovitis with effusion
- ↓ (c) Delayed  
 (5) Subsidence with limited terminal extension
- ↓ (d) Exacerbation  
 (a) Slight recurrent effusion  
 (b) Vastus wasting  
 (c) Disability
- + (e) Tenderness midway between  
 (a) Inner margin of lig patella  
 + (b) Inner tibial tuberosity  
 (f) X Ray Negative



**(B) Posterior horn tear without locking**

- (a) History of abduction-eversion strain
- (b) Sensation of insecure joint
- (c) No locking
- (d) McMurray's click

In Postero-internal compartment

When (a) Tibia is inverted and everted  
or abducted and adducted

(β) Slow extension of knee from full flexion with leg everted and abducted

**(2) External semilunar cartilage :**

- (a) History of adduction-inversion strain
- (b) Effusion in the joint
- (c) Pain and tenderness on outer side
- (d) Limitation of terminal extension
- (e) McMurray's click

On (a) Adduction-inversion and gradual extension of fully flexed tibia (post. horn)

(β) Active extension (ant. horn)

Diff. diag (1) Arthritis tuberculous or traumatic  
(2) Loose body  
(3) Lateral ligament lesions  
(4) Synovial nipping  
(5) Cruciate ligament lesions  
(6) Intra-articular fractures

**Treat****(1) Conservative :**

Ind (a) Normal knee joint with history of one attack  
(b) Elderly patient with

(1) History of recurrent attacks

+ (2) Arthritis

+ (3) No locking

Tech (A) (1) Pressure bandage  
+ (2) Quadriceps drill + faradism

**(B) (1) Manipulative reduction :**

Ind Locking (Internal cart.)

Tech { Full flexion of the knee  
+ External rotation of the leg  
Local pressure

↓ { Sudden extension of the knee  
+ Sudden internal rotation of the leg

## (2) Fixation

In Extension  
By Back splint  
For 4 weeks

With Massage and quadriceps drill

## (2) Operative excision (See under operations)

- Ind (1) Recurrent locking  
(2) Failure of manipulations  
(3) Bucket-handle tears  
(4) Traumatic osteoarthritis

## (C) Cysts of the semilunar cartilages

Etiol Males between 20 and 40

External cartilage

- Path (a) Congenital  
(b) Mucoid degeneration due to contusion of meniscus

- Clinic (a) History of trauma  
(b) Painful swelling on the lateral side  
(c) X Ray pressure atrophy of outer condyle of tibia

Treat Excision of the cyst with the cartilage

## (7) Loose bodies in the knee Joint mice

Path Fisher's classification

## (A) Loose bodies in pathological joints

- (1) Osteoarthritis osteophytes  
(2) Charcot joint osteophytes  
(3) Tuberculosis articular cartilage  
(4) Acute infective arthritis art. cartilage

## (B) Loose bodies in apparently normal joints

- (1) Osteochondritis dissecans  
Art. cartilage and bone  
(2) Semilunar cartilage pieces  
(3) Detached epiphysis

## (C) Synovial chondromata

Nature of loose bodies

- (1) Osteophytes  
(2) Chondrophytes  
(3) Synovial villi  
(4) Loose articular cartilage  
(5) Loose semilunar cartilage  
(6) Loose melon-seed bodies  
(7) Loose fractured bone pieces

Clinical groups

- (1) Palpable painless loose body  
(2) Locking joint

- (3) Problematical knee  
 Recurrent painful locks with effusion
- (4) Pseudo internal semilunar cartilage lesion
- (5) Osteoarthritis
- (6) X-Ray evidence
- Compl (a) Osteoarthritis  
 (b) Disintegration of the joint
- Treat (1) Removal  
 (2) Synovectomy (in synovial chondromata)
- (8) Lipoma Arborecence :
- Etio Obesity  
 Osteoarthritis  
 Weak quadriceps
- Path Diffuse lipoma behind the ligamentum patella
- Clinic (1) Pain behind and on both the sides of lig patella  
 (2) Swelling behind and on both the sides of the lig.  
 (3) Painful extension + painless flexion  
 (4) Recurrent effusion
- Treat (1) Conservative  
 (a) Physio and electro therapy of quadriceps  
 (b) Knee cage to prevent full extension  
 (2) Operative excision
- (9) Rupture of the extensor apparatus of the knee :
- Etio Powerful involuntary muscle contraction  
 Regaining balance in a fall
- Clinic (a) History  
 (b) Snap  
 (c) Hæmarthrosis  
 (d) Loss of active extension of the knee  
 (e) Gap
- Varieties
- (A) Suprapatellar: Avulsion of the quadriceps :  
 Rectus femoris aponeurosis
- Etio Elderly
- Path (a) Partial  
 (b) Complete
- Clinic (a) Painful swelling of the knee  
 (b) Limited extension of the knee  
 (c) Palpable suprapatellar gap
- Compl Myositis ossificans
- Treat (A) Partial fixation in backslint for  
 two weeks  
 ↓ crepe bandage
- (B) Complete

Operation (a) Suture of the tendon to patellar aponeurosis

↓ After-treat Rest in plaster shell for 6 weeks

- with (a) Paralysis after 10 days  
 (b) Allowed up after 15 days  
 (c) Active exercises after 21 days  
 (d) Walk in plaster after 30 days  
 (e) Removal of plaster after 45 days

(B) Transpatellar Rupture of the tendon with fracture patella  
 (See fracture patella)

(C) Infra patellar

- (a) Avulsion of lig. patellae from patella  
 (b) Rupture of lig patella midway

Clinic (1) Loss of extension  
 (2) Upward displacement of patella

Compl Myositis ossificans traumatica

Treat (A) Suture of the tendon  
 (B) Fascial reconstruction of the tendon  
 Ind Old cases

After treat Fixation  
 In Extension  
 By Plaster-of Paris  
 For 8 weeks

(D) Fracture tibial tubercle  
 or Separation of tibial tubercle epiphysis  
 with Quadriceps extensor insertion  
 (See under tibial fractures)

## (C) ARTHRITIS OF THE KNEE

### (1) TRAUMATIC SYNOVITIS

- Etio (1) Sprain  
 (2) Dislocation  
 (3) Fracture dislocation  
 (4) Internal derangement

### (2) INFECTIVE ARTHRITIS

Path. position (1) Flexion 45°  
 (2) Triple displacement Flexion  
 Eversion  
 Backward displacement

Swelling (1) Subcrural pouch  
 (2) Patellar hollows

Special sign Patellar tap

Therapeutic position (1) Straight after excision  
(2) Flexion 5-10

Special treatment Disarticulation by open method  
(See under Infective Arthritis)

(3) GONOCOCCAL ARTHRITIS

(See under joints)

(4) SYPHILITIC ARTHRITIS (See under joint)

(1) Clutton's joints

(2) Secondary symmetrical bilateral  
hydrarthrosis

(3) Secondary monarticular plastic arthritis  
+ periarthritis

(4) Tertiary local synovial gumma or  
gummatous synovitis

(5) TUBERCULOSIS OF THE KNEE

Etio Age 20 years

Incidence Second to spine

Path Origin (a) Synovial non-focal  
(b) Osseous extra-articular focal  
(a) Femur  
(b) Tibia

Clinic (A) Tumour albus :

- (1) Pulpy white synovial thickening
- (2) Muscular wasting
- (3) Spindle-shaped joint
- (4) Limited painful movements

(B) Localized nodular synovial T.B.

(Riedel or Konig)

- (1) Young girls
- (2) Nodular synovial thickening
- (3) Marked effusion
- (4) Free and painless movements

(C) Tuberculous hydrops of the knee

Marked effusion with melon-seeds

(D) Tuberculous empyema of the knee

Distension with tuberculous debris

(E) Pathological dislocation :

- (1) Flexion
- + (2) Eversion
- + (3) Backward subluxation

Diff. Diag (1) Acute traumatic arthritis  
(2) Internal derangement  
(3) Rheumatoid or osteoarthritis  
(4) Syphilitic arthritis

- (5) Gonococcal arthritis
- (6) Tumours of constituent bones

**Treatment****(1) Conservative**

- Ind** (1) Children below 9 years  
 (2) Early cases  
 (3) Acute phase  
 (4) Synovial disease

**Tech (1) Weight extension**

In The direction of deformity  
 By Thomas knee splint

**↓ (2) Weight extension**

In Corrected or optimum position  
 By Thomas knee splint

**↓ (3) Fixation**

In Correct position  
 By Plaster-of Paris

**↓ (4) Locomotion**

In Thomas knee splint  
 With Crutches and patten

**↓ (5) Weight bearing****(2) Operative**

- Ind** (1) Adults  
 (2) Late cases failure of conservatism  
 (3) Chronic phase  
 (4) Osseous origin

**Operations**

- (1) Arthrectomy In children  
 (2) Excision with arthrodesis In adults  
 (3) Amputation

- Ind** (a) Relapse after excision  
 (b) Septic sinuses  
 (c) Excessive shortening  
 (d) T B elsewhere  
 (e) Bad general health  
 (f) Waxy disease

**(6) OSTEOARTHRITIS OF THE KNEE**

(See under general joints)

- Clinical types** (1) Wet type hydrarthrosis  
 (2) Dry type osteophytes  
 (3) Intermediate type

**(7) CHARCOT'S JOINT (See under general joints)**

**Etio** Tabes dorsalis

- Clinic** (1) Painless effusion with abnormal movements  
 (2) Tabetic signs

## (8) LOOSE BODIES IN THE JOINT

(See under internal derangements)

## (9) ANKYLOSIS OF THE KNEE

(See under general joints)

Path. position (1) Flexion 45°  
 (2) Triple subluxation Flexion  
 Eversion  
 Backward

Therapeutic (1) Flexion 5°-10°  
 (2) Full extension after excision

## (D) OPERATIONS ON THE KNEE

## (1) Arthrotomy

## Ind (A) Drainage

Septic arthritis

## (B) Exploration

(a) Penetrating wounds

(b) Foreign and loose bodies

(c) Diagnostic (Biopsy)

## (C) Minor therapeutic steps

Etherization

Sites (A) Drainage Lateral incisions on either side of  
 ligamentum patellæ

(B) Exploration (a) In front of biceps  
 (b) Between semimembranosus  
 and semitendinosus

## (2) Exposure of the joint

## Ind Intra-articular lesions

(a) Removal of Hypertrophied villi  
 Osteo and chondro phytes  
 Loose cartilage

(b) Synovectomy

(c) Exploration and excision or reconstruction  
 Of Semilunar cartilages  
 Cruciate ligaments

## Tech (A) Old classical method :

Horseshoe flap containing

(1) Patella

(2) Tibial tubercle

## (B) Robert Jones split patella method

(a) U shaped skin flap

(b) Vertical median division of

(1) Quadriceps tendon

(2) Patellar capsule

(3) Ligamentum patella

(4) Patella

(5) Synovial membrane

- (c) Retraction of the halves
- (d) Catgut sutures at the end
- (C) Internal lateral incision of Fisher
  - (a) Incision along the inner side of patella and suprapatellar pouch
  - (b) Division of the fascia in midline
  - (c) Division of capsule and synovium  $\frac{1}{2}$  inch internal to patella
- (D) External lateral incision (as in C)
  - Substitute external for internal
  - outer for inner

(5) Excision of the semilunar cartilages

- (1) Tourniquet
- (2) Position right angled flexion of the knee
- (3) Incisions
  - (A) Anterior approach
    - (a) Internal cartilage
      - (a) Oblique over antero-internal compartment
      - or (b) Parallel to inner border of patella and patellar ligament
    - (b) External cartilage
      - (a) Oblique over the antero-external compartment
      - or (b) Parallel to outer border of patella and patellar ligament
  - (B) Posterior approach
    - Ind (a) Posterior horn of internal cartilage
    - (b) Inability to remove whole cartilage by anterior route
    - (c) Recurrence after removal of anterior portion
- Incisions (1) Behind and parallel to int. lateral lig.
- (2) Along the anterior border of sartorius one inch behind adductor tubercle
- (4) Incision of the capsule, fat and synovium
- (5) Detachment anterior horn
  - ↓ lateral border
  - ↓ posterior horn
- (6) Closure synovium
  - ↓ capsule
  - ↓ skin

- After-treat
- (1) Pressure bandage + back splint immediate
  - (2) Quadriceps drill + faradism after 24 hours
  - (3) Movements of the joint after 10th day
  - (4) Weight bearing after 15th day
  - (5) Crepe bandage till subsidence of effusion
  - (6) Synovectomy of knee joint
- Ind (1) Osteoarthritis
- (2) Non-suppurative chronic sclerosing synovitis



- Tech** (a) Incision lateral J  
 (b) Removal of tibial tubercle  
 (c) Incision of lateral portion of capsule  
 (d) Dissection of synovial membrane  
     Including supra-patellar pouch  
     Excluding semilunars and cruciate lig  
 (e) Fixation of tibial tubercle in place
- After-treat** (1) Gutter splint for 2 weeks  
 ↓ (2) Active movements
- (5) **Excision and arthrodesis of the knee**
- Ind** (1) Tuberculosis  
 (2) Old infective arthritis  
 (3) Osteoarthritis  
 (4) Compound comminuted fracture  
 (5) Flail paralytic joint  
 (6) Unsound ankylosis
- Contraind** Flexion more than a few degrees
- Tech** (1) Raise U skin-capsule-patella flap  
 (2) Dissection of synovium with suprapatellar pouch  
 (3) Section of the bones  
     (A) Femur: Children only cartilage  
         Adults  $\frac{1}{2}$ rd of condyle  
         (At right angles to long axis)  
     (B) Tibia thin slice  
 (4) Tubby & patellar peg  
     : Section of deep surface of patella  
     Freshening ant. surfaces of femur + tibia  
     Patellar graft across
- or (4) Excise the patella
- (iii) **Closure**  
 (Sometimes use of bone-grafts or Wyeth's pins)
- After-treat** (1) First day Fixation  
     In Optimum position: straight  
     By Plaster-of-Paris  
     Extent Foot to pelvis  
 (2) Tenth day Bivalve the plaster  
     Removal of sutures  
 (3) Twenty-second day  
     (a) Renewal of plaster from thigh to foot under  
         anaesthesia  
     + (b) Walking on crutches  
 (4) Sixty-first day  
     (a) Moulded leather and celluloid case with lateral  
         struts  
     + (b) Weight bearing  
 (5) In T.B. Thomas' knee splint + calliper  
     : For one year

**(6) Arthroplasty of the knee**

- Ind** (1) Mobility required  
(2) Femoro-patellar ankylosis only
- Contraind** (a) Children  
(b) Tuberculosis
- Tech** (1) Incision long antero-lateral J  
(2) Detachment of tibial tubercle  
(3) Exposure of the joint  
(4) Excision and shaping of bony ends  
(5) Interposition of fascia lata  
(6) Closure
- After-treat** (1) Weight extension 10 lbs.  
In Semiflexion  
By Gutter splint  
For Two weeks  
↓ (2) Suspension  
From Overhead frame  
For Four weeks  
↓ (3) Walking with calliper + exercises  
↓ (4) Weight bearing after 12 weeks

**(II) ANKLE JOINT:****(A) TRAUMA****(1) SPRAINS, DISLOCATIONS AND FRACTURE DISLOCATIONS OF ANKLE****(A) Inversion strains with ext. lig injuries****(1) Sprain of external ligament**

**Def** Every inversion injury of ankle joint, which is stable, with negative X Ray

**Eto** Sudden inversion strain

**Path** Stretching or tearing of a few fibres of external lig.

**Clinic** (1) Local inflammatory ecchymosis  
Below and in front of lateral malleolus  
(2) No instability of the joint  
(3) Negative X Ray

**Treat** (A) Elastoplast  
Elastoplast in eversion } for 10  
+ Non weight bearing exercises } days

**(B) Leriche**

Periarticular 10 c.c. of 2% novocain

**Compl** (1) Adhesions  
(2) Tuberculosis

(2) Avulsion or tearing of external ligament with dislocation astragalus

- Tech :** (a) Incision lateral J  
 (b) Removal of tibial tubercle  
 (c) Incision of lateral portion of capsule  
 (d) Dissection of synovial membrane  
     Including supra-patellar pouch  
     Excluding semilunars and cruciate lig.  
 (e) Fixation of tibial tubercle in place
- After-treat** (1) Gutter splint for 2 weeks  
 ↓ (2) Active movements
- (5) **Excision and arthrodesis of the knee**
- Ind** (1) Tuberculosis  
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- Contraind** Flexion more than a few degrees
- Tech** (1) Raise U skin-capsule-patella flap  
 (2) Dissection of synovium with suprapatellar pouch  
 (3) Section of the bones  
     (A) Femur Children only cartilage  
         Adults  $\frac{1}{3}$ rd of condyle  
         (At right angles to long axis)  
     (B) Tibia thin slice  
 (4) Tubby's patellar peg  
     Section of deep surface of patella  
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     Patellar graft across
- or (4) Excise the patella  
 (5) Closure  
 (Sometimes use of bone-grafts or Wyeth's pins)
- After-treat** (1) First day Fixation  
     In Optimum position straight  
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     Extent: Foot to pelvis  
 (2) Tenth day Bivalve the plaster  
     Removal of sutures  
 (3) Twenty-second day  
     (a) Renewal of plaster from thigh to foot under  
         anæsthesia  
     + (b) Walking on crutches  
 (4) Sixty-first day  
     (a) Moulded leather and celluloid case with lateral  
         steels  
     + (b) Weight bearing  
 (5) In T.B. Thomas' knee splint + calliper  
     For one year

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By Gutter splint  
For Two weeks

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From Overhead frame  
For Four weeks

- ↓ (3) Walking with calliper + exercises

- ↓ (4) Weight bearing after 12 weeks

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Below and in front of lateral malleolus  
(2) No instability of the joint  
(3) Negative X Ray

- Treat** (A) **Elastoplast**  
Elastoplast in eversion } for 10  
+ Non weight bearing exercises } days

**(B) Leriche**

- Periarticular 10 c.ca. of 2% novocain

- Compl** (1) Adhesions  
(2) Tuberculosis

- (2) Avulsion or tearing of external ligament with dislocation astragalus

- Def** Inversion injury of the ankle joint with excessive lateral mobility of talus
- Etio** Inversion strain
- Path** (1) Complete avulsion of anterior and middle bands of external lateral ligament  
(2) Subluxation of talus
- Clinic** (a) Local signs  
(b) Excessive internal displacement of talus on inversion  
(c) X Ray With foot in inversion  
Tilting of talus
- Treat** Fixation  
In Optimum position  
By Plaster-of Paris  
Extent Below the knee to metatarsal heads  
For 10 weeks
- Compl** (1) Compound dislocation  
Treat Debridement + Winnet Orr  
(2) Recurrent dislocation  
Clinic (1) Frequent 'giving way' with insecurity of the joint  
(2) Medial displacement of talus on inversion of the foot  
(3) X Ray in inversion  
Treat (a) Apparatus  
Inside iron + outside T strapp  
(b) Operative reconstruction  
Tenodesis by peroneus brevis tendon from external malleolus to talus neck
- After treat Fixation  
In Optimum position  
By Plaster-of Paris  
For 8 weeks
- (3) Fracture-dislocation (See under fractures)
- (B) Abduction-eversion strains With internal ligament injuries
- (1) Sprain of internal ligament
- Clinic** Local tenderness
- Treat** (1) Elastoplast  
(2) Leriche novocain injection
- (2) Avulsion or rupture of internal ligament
- Clinic** (1) Local signs  
(2) Lateral displacement of talus on eversion  
(3) X Ray in eversion: tilting of talus



↓ (2) Walking plaster  
In Right angled dorsiflexion + neutral position  
For 5 weeks

↓ (3) Viscopaste or elastoplast strapping

(3) Midtarsal dislocation

Path Through (1) Astragulo-scapoid  
+ (2) Calcaneo-cuboid

Clinic Deformity of the foot

Treat (1) Manipulative reduction  
↓ (2) Walking plaster  
In Optimum position  
For 6 weeks

(B) ARTHRITIS *Special causes*

(1) Secondary syphilitic midtarsal arthritis  
Monarticular plastic arthritis and periartthritis

(2) Tuberculous arthritis of tarsal joints

Etiol Neglected sprains

Path Origin osseous (a) Os calcis  
(b) Astragalus  
(c) Cuboid

Clinic (1) Painful lump  
(2) Restricted eversion and inversion  
(3) Shiny tender oedematous swelling  
(4) Cold abscesses and sinuses

Compl Secondary pyococcal infection

Treat (1) Plaster-of Paris immobilisation  
(2) Scraping  
(3) Excision of bones  
(4) Amputation at the site of election

(3) Osteoarthritis

Metatarso-phalangeal joint of great toe

(4) Gout Metatarso-phalangeal joint of great toe

(C) OPERATIONS ON FOOT JOINTS

*Arthrodesis*

Ind (1) Infantile paralysis  
(a) Two years after the onset  
(b) Residual after physiotherapy  
(c) Age more than 10

+ (2) Persistent deformity with majority of  
muscles paralysed

(A) Midtarsal arthrodesis:

Tech: (1) Incision: inner side of the dorsum  
from astragalus to scaphoid  
(2) Displacement of soft tissues

## (G) Removal of cartilage from

- (a) Head of astragalus
- (b) Scaphoid
- (c) Cuboid
- (d) Os calcis

} if required

## (4) Closure

## After-treat Fixation

- In (a) Heel and heads of 1st and 5th metatarsal in one plane
- (b) Ankle at right angles

By Plaster-of-Paris

For 3 months

## (B) Posterior subastragaloid arthrodesis

Tech (1) Incision along the inner side of tendo achillis

(2) Displacement of soft tissues

(3) Removal of cartilage from

- (a) Astragalus
- (b) Os calcis

## (4) Closure

## After-treat As in (A)

## (C) Dunn's triple arthrodesis

Tech (1) Incision

(a) External

2" above the ankle to the base of 5th metatarsal

or (b) Dorsal skin flap

(2) Retraction of soft tissues

(3) Exposure of joints

(a) Subastragaloid

(b) Calcaneo-cuboid

(c) Astragulo-scapoid

(4) Removal of

(a) Scaphoid

(b) Cartilage from

(1) Head of astragalus

(2) Post. surfaces of cuneiforms

(3) Calcaneo-cuboid joint

(4) Posterior subastragaloid joint

## (5) Closure

## After-treat Fixation

In Corrected position (See A)

By Plaster-of-Paris

For 3 months

## IMPORTANT POINTS

- (1) Most common sequela of joint trauma  
Traumatic adhesions
- (2) Most common sequela of neglected sprain  
Tuberculosis of the joint



- (3) Sprain requires no more than regular muscle exercises  
Ruptures and avulsions necessitate plaster immobilisation
- (4) Muscles are first line of defence of a joint. Ligaments are second.
- (5) Stiffer the joint, less valuable is the manipulative treatment.  
More mobile the joint, more valuable is the manipulative treatment.
- (6) Manipulative treatment is most successful in
  - (a) Tennis elbow
  - (b) Strains of knee
  - (c) Strains of ankle
- (7) Bony ankylosis is the rule in suppurative arthritis and T. B. spine. Fibrous ankylosis or resolution is the rule in non-suppurative arthritis.
- (8) No operations on joints should be undertaken without
  - (a) X Ray films
  - (b) Preoperative plaster splint or extension preparations
  - (c) Surety of asepsis
- (9) No-touch technique is the best in bone and joint surgery
- (10) Incisions for exposure of a joint
  - (a) Adequate exposure
  - (b) Avoidance of nerves, vessels and tendons
  - (c) Over the intermuscular spaces
  - (d) Capsulotomy in the long axis of the limb
- (11) Stiff joints are more frequent after the use of the drainage tubes. No drainage tube should enter the joint cavity.  
Drainage tube or rubber dam should be introduced upto but not through the synovium.
- (12) Some form of arthrodesis is advocated in all cases of joint tubercle, when they are quiescent, provided no sinuses exist.
- (13) Extra-articular arthrodesis has been accepted as the necessary method for all cases of joint tuberculosis which are slow in recovery and where X Ray at the end of one year's conservatism shows destruction of cartilage.
- (14) In all cases of apparently incurable poly-articular ankylosis of unknown origin, if there is hypercalcaemia, parathyroidectomy is worth considering.
- (15) Arthrodesis is better in :
  - (a) Active and persistent chronic affections : T. B.
  - (b) Laborious occupations
  - (c) Lower extremity
- (16) Arthroplasty is better in
  - (a) Traumatic cases
  - (b) Skilful occupations
  - (c) Upper extremity

- (17) Arthroplasty is seldom indicated in tuberculosis
- (18) Joints for arthroplasty
  - (a) Elbow
  - (b) Hip
  - (c) Jaw
  - (d) Knee
- (19) Joints for arthrodesis
  - (a) Knee
  - (b) Shoulder
  - (c) Wrist
  - (d) Ankle
- (20) Patients in acute joint condition  
Do the minimum most delicately
  - (a) Aspiration or small arthrotomy
  - (b) Gradual atraumatic weight extension
    - (a) Gradual change from pathological into physiological position
    - (b) Relief of muscle spasm
    - (c) No bone friction
- (21) During infancy pneumococcus is the commonest cause of acute arthritis.
- (22) Painful osteoarthritis metabolic, toxic or mechanical  
Painless osteoarthritis Charcot
- (23) Pyococcal gonorrheal and osteoarthritic are the most common forms of arthritis of temporo-mandibular joint.
- (24) Internal derangement due to abnormal menisci
  - (a) Temporo-mandibular snapping jaw
  - (b) Knee medial or lateral meniscus
- (25) Intra articular ankylosis of temporo-mandibular joint requires excision and arthroplasty Extra articular ankylosis requires Esmarch's operation.
- (26) In acromio-clavicular dislocation strapping should go over the clavicle and supra-clavicular triangle and not over the shoulder.
- (27) Arthrodesis of acromio-clavicular joint leads to limitations of abduction of shoulder and scapular movements.
- (28) Every patient with shoulder dislocation must be examined for nerve lesions. Most common nerve involved is the axillary with deltoid paralysis.
- (29) Passive stretching in the after-treatment of dislocation shoulder leads to
  - (a) Permanent stiffness
  - (b) Myositis ossificans

- (30) Abduction frame in shoulder injuries
- (a) *Adduction fractures anatomical neck of the humerus*
  - (b) *Abduction unimpacted fracture*  
Surgical neck of the humerus  
Only along with traction
  - (c) *Dislocation shoulder with*
    - (a) *Fracture greater tuberosity*
    - (b) *Avulsion of supraspinatus*
  - (d) *Fracture-dislocation of greater tuberosity*
- (31) *Until eversion is regained full abduction cannot be regained in the shoulder joint.*
- (32) *Many shoulders stiff after trauma, are made stiffer by manipulations given too soon, too often and too much.*
- (33) *Operations for recurrent dislocations of shoulder*
- (1) *Clairmont Deltoid sling extra-articular*
  - (2) *Bankart Repair of anterior part of glenoid ligament*  
Articular
  - (3) *Ondard Turning coracoid piece down after plication*  
Articular + extra-articular
  - (4) *Henderson Fascial sling through head*  
Intra-articular
  - (5) *Nicola Long biceps tendon through head*  
Intra-articular
  - (6) *Hey Groves Fascial sling extra-articular.*
- (34) *A great number of disabled shoulder joints are in reality due to rupture of supraspinatus tendon and any case of shoulder injury with loss of abduction should be operated upon to explore the condition of supraspinatus tendon.*
- Tech (1) *Vertical slit of the deltoid*  
(2) *Open the subacromial bursa*  
(3) *Silk suture of the tendon*
- After-treat *Abduction fixation*
- (35) *Forward dislocation of the elbow is the only dislocation to be treated in extension.*
- (36) *Painful inability to supinate and extend in children with history of any pull on the elbow*  
 Diag *Nipped synovial membrane*  
 Treat *Flex → extend → supinate.*
- (37) *In adults when a simple comminuted fracture of the lower end of humerus has injured the articular surface extensively an arthroplasty of the elbow should be carried out within ten days of the injury*

- (38) A patient with an elbow soundly ankylosed in good position will seldom require an arthroplasty
- (39) The diagnosis of simple sprain of the wrist must be accepted with considerable caution, unless repeated radiograms in all possible directions exclude bone injury
- (40) Widely displaced semilunar should be excised as early as possible.
- (41) Arthrodesis is far better than arthroplasty in wrist.
- (42) Differential diagnosis of chronic wrist conditions
  - (1) Chronic sprain of the wrist
  - (2) Fracture navicular
  - (3) Post traumatic semilunar dystrophy : Kienboch
  - (4) Chronic osteoarthritis
  - (5) Tuberculosis.
- (43) In arthroplasty of metacarpo-phalangeal joints preserve metacarpal heads : excise phalanx bases pin extension through the pulp in the after-treatment
- (44) Causes of unequal legs
  - (1) Malunion of fractures
  - (2) Faulty ankylosis of the hip
  - (3) Poliomyelitis
  - (4) Congenital dislocation of the hip.
- (45) In cases of low backache, determine whether it is due to arthritis of
  - (a) Sacroiliac joint do arthrodesis
  - (b) Lumbar spine do fusion
  - (c) Both do arthrodesis + fusion.
- (46) Early sacroiliac tuberculosis conservative treatment  
↓ extra-articular arthrodesis.
- (47) Extra-articular arthrodesis is better than intra-articular method in sacroiliac joint.
- (48) The most frequent complication of dislocation of the hip joint is avascular necrosis of the head of the femur
- (49) If in post reduction radiograph lesser trochanter is not seen dislocation of the hip is not reduced. Confirm by taking a lateral radiograph.
- (50) There are five phases of congenital dislocation of the hip
  - (1) Predislocation stage Braur's test infants
  - (2) Reduction stage 1 to 3 years
  - (3) Open operation stage 3-6 years
  - (4) Reconstructive stage 6 years to adolescence
  - (5) Palliative stage adults.

- (51) In old cases of congenital dislocation of the hip the femoral head is displaced in three directions
  - (1) Upward shortening
  - (2) Backward lordosis
  - (3) Outward rolling gait.
- (52) After reduction of congenital dislocation of the hip the femoral head should lie vertically below the sacroiliac joint.
- (53) A persistent hip lesion in a child under five is likely to be tuberculous between five and ten pseudo-coxalgia is more common in the second decade, traumatic coxa vara is the characteristic affection, tuberculosis being comparatively rare.
- (54) Coxitis in children
  - (1) Congenital dislocation infancy
  - (2) Tuberculosis 1 to 5 years
  - (3) Pseudo-coxalgia 5 to 10 years
  - (4) Traumatic coxa vara 10 to 20 years
  - (5) Infective arthritis
- (55) Complete disappearance of spasm after 4-8 weeks of treatment together with persistently negative X Rays, is very suggestive of non tuberculous lesion.
- (56) Recurrence of symptoms when patient is allowed to get up points strongly to tuberculous hip.
- (57) Extra-articular arthrodesis is a good step in early stages of tuberculosis of the hip either as soon as the disease is diagnosed or at the termination of conservative treatment.
- (58) Limitation of all movements, especially of extension (pseudo-spasm) is the earliest sign of T. B. hip.
- (59) If the limb can be placed across the middle third of the opposite thigh, it is not T. B. hip.
- (60) Ability to sit in tailor's position excludes T. B. hip.
- (61) In subtrochanteric osteotomy for ankylosis of hip the angle of corrective abduction should not be more than 25°. Success of Lorenz's bifurcation osteotomy depends upon the fixation of limb in correct abduction.
- (62) After any operation on the hip joint majority of patients are more comfortable if they wear a caliper for some months after operation.
- (63) Worst treatment of sprained knee is
  - (a) Immobilisation in splint or plaster
  - (b) Neglect of muscle exercise
  - (c) Knee cage

- (64) Importance of active non weight bearing exercises of quadriceps extensor for five minutes hourly throughout the day cannot be overemphasised in injuries of the knee joint which require immobilisation.
- (65) In young patients most common knee joint injuries are
- Tears of internal lateral ligament
  - Tears of internal semilunar cartilage
- (66) In middle-aged and elderly people, most common knee joint affections are
- Injury to perisynovial fat
  - Rupture of adhesions
- (67) Complete tear of the internal lateral ligament is indicated by abduction of the leg on the femur for  $30^{\circ}$  or more.
- (68) Locking limitation of flexion and extension due to mechanical obstruction.
- (69) If one finds
- Small joint effusion
  - Tenderness at the typical place
  - Wasting of vastus internus
  - Typical history
- It is a case of torn semilunar cartilage if X Ray excludes other conditions.
- (70) If there is a persistent click within the last  $10^{\circ}$  of full extension it is conclusive of external cartilage tear
- (71) Loose bodies in knee joint
- Young age
- Detached semilunar cartilage
  - Detached articular cartilage
- Old age Detached osteophytes
- (72) In the first half of life, loose bodies should always be removed from the knee joint if they give rise to symptoms.
- (73) In torn or loose semilunar cartilage, it is better to excise the whole cartilage than only the injured portion.
- (74) When the knee joint has suffered severe injury X Ray may show a normal appearance although the main ligaments are torn.
- (75) In doubtful cases, examine the knee joint under anaesthesia and forcible movements in all directions should be tested.
- (76) Early treatment for cruciate ligament ruptures is plaster immobilisation for three months. If there is instability of joint as a sequela, Hey Grove's fascia lata method may be employed.

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- (76) Early treatment for cruciate ligament ruptures is plaster immobilisation for three months. If there is instability of joint as a sequela, Hey Grove's fascia lata method may be employed.



- (77) Primary osseous T.B of the knee is more amenable to treatment than primary synovial tuberculosis.
- (78) Routine treatment of T.B. knee  
 (a) Below 9 years conservative only  
 (b) Adults excision  $\rightarrow$  arthrodesis  
 (c) Primary osseous lesion : extra-articular erosion or excision.
- (79) In T.B. knee, synovial disease and childhood are indications for conservative treatment whereas bony lesions in adults require excision with arthrodesis.
- (80) In exposure of knee joint, Timbral Fisher's interno-lateral exposure is better than Robert Jones's split patella method.
- (81) Stiff painless knee in good position performs excellent function.
- (82) Knee cage hinders the recovery of knee joint lesions by coming in the way of muscle exercises.
- (83) In all fracture-dislocations of the ankle, immobilisation is necessary for at least ten weeks, after which zinc-gelatin dressings for six weeks with active exercises of ankle and tarsal joints are enjoined walking being allowed with plaster boot after three weeks.
- (84) Osteoarthritis is the most common sequela of injuries of ankle joint.
- (85) Summary of joint affections  
 (1) Congenital dislocations  
     Hip  
 (2) Trauma  
     (A) Spram ankle, knee, wrist, shoulder elbow  
     (B) Dislocations and subluxations  
         Shoulder hip  
     (C) Fracture-dislocations  
         Ankle, shoulder elbow hip  
     (D) Internal derangements  
         Knee temporo-mandibular  
     (E) Penetrating wounds  
 (3) Inflammations  
     (A) Traumatic arthritis sprains  
     (B) Infective arthritis  
         (a) Pyogenic ( $\alpha$ ) Pyococcal  
             ( $\beta$ ) Pyæmic  
         (b) Pneumococcal one large joint  
         (c) Typhoid hip

- (C) Specific
- (a) Gonorrheal knee, ankle, digits, temporo-mandibular
  - (b) Syphilitic knee
  - (c) Tuberculous knee, hip, ankle, tarsal shoulder, elbow wrist carpal
- (D) Toxic metabolic or mechanical arthritis
- (a) Focal secondary any
  - (b) Rheumatoid proximal inter phalangeal metacarpo-phalangeal
  - (c) Osteoarthritis knee, hip shoulder metacarpo-phalangeal of thumb metatarso-phalangeal of great toe temporo-mandibular
  - (d) Rheumatic any joint, multiple
  - (e) Gouty metacarpo-phalangeal of thumb
- (E) Neurotrophic arthritis
- (a) Hysterical
  - (b) Charcot knee shoulder
  - (c) Trophic
- (F) Miscellaneous arthritis
- (a) Non-gonorrheal urethritic
  - (b) Dysenteric
  - (c) Zymotic

- (4) Abnormal contents
- (A) Hydrarthrosis knee, shoulder
  - (B) Hæmarthrosis knee
  - (C) Pyarthrosis
  - (D) Loose bodies : knee
- (5) Ankylosis
- (A) False
  - (B) True (a) Fibrous (b) Bony

- (86) Multiple arthritis
- (1) Pyæmic
  - (2) Gonorrheal
  - (3) Syphilitic symmetrical
  - (4) Rheumatoid
  - (5) Osteoarthritis senile
  - (6) Rheumatic
  - (7) Dysenteric
- (87) Painful arthritis
- (1) Pyococcal
  - (2) Tuberculous
  - (3) Gonorrheal

- (4) Rheumatoid
- (5) Rheumatic and gouty
- (6) Osteoarthritis

(88) Relatively painless arthritis

- (1) Pyæmic
  - (2) Syphilitic
  - (3) Neuropathic.
-

## CHAPTER IX

# WATSON JONE'S CLASSIFICATION OF INJURIES

### (1) INJURIES OF THE SPINE

- (1) Fractures of transverse processes
- (2) Fractures of spinous processes
- (3) Fractures of dorso-lumbar vertebrae
  - (A) Flexion fractures
    - (1) Compression fracture
    - (2) Comminuted fracture
    - (3) Fracture-dislocation
  - (B) Extension fractures
- (4) Fracture dislocations of cervical spine
  - (A) Crush fracture
  - (B) Sprain of cervical joint
  - (C) Subluxation of cervical joint
  - (D) Dislocation of cervical joint
- (5) Fracture-dislocations of atlas
  - (A) Fracture
  - (B) Hyperextension fracture-dislocation
  - (C) Forward dislocation
    - (1) Without fracture odontoid
    - (2) With fracture odontoid
  - (D) Spontaneous dislocation
- (6) Vertebral fracture-dislocation with paraplegia
- (7) Scliotic scoliosis syndrome
  - (A) Myofascial and ligamentous injuries
    - (1) Sacrospinalis and gluteus
    - (2) Fascial contractures and adhesions
    - (3) Inter-articular ligamentous strain
      - (a) Sacroiliac
      - (b) Lumbo-sacral
  - (B) Joint injuries and arthritis
    - (1) Sacroiliac
    - (2) Spondylitis deformans
    - (3) Osteoarthritis lumbar spine
    - (4) Lumbo-sacral
    - (5) Inter-articular

(8) **Intervertebral disc injuries**

- (A) Retropulsion of the disc
- (B) Fibrosis of ligamentum flavum

**(II) INJURIES OF THE PELVIS**(1) **Avulsion fractures of the pelvis**

- (A) Anterior superior iliac spine sartorius
- (B) Anterior inferior iliac spine rectus femoris
- (C) Ischial apophysis hamstring

(2) **Isolated injuries of the pelvic ring**

- (A) Fractures of pubic ramus
- (B) Sacroiliac subluxation

(3) **Combined injuries of the pelvic ring :**

- (A) Pubic segments
  - (1) One side
  - (2) Both sides
- (B) Iliac and pubic segments
  - (1) Dislocation
  - (2) Fracture-dislocation

(4) **Injuries of sacrum and coccyx**

- (A) Fracture sacrum
- (B) Fracture coccyx

**(III) INJURIES OF THE CHEST**

- (1) Fracture ribs
- (2) Fracture sternum
- (3) Fracture thyroid cartilage

**(IV) INJURIES OF THE FACE AND JAW**

- (1) Fracture nasal bones
  - (A) Lateral impaction
  - (B) Vertical impaction
- (2) Fracture malar bone
- (3) Injury to mandible :
  - (A) Simple fracture
  - (B) Simple dislocation
    - (1) Unilateral
    - (2) Bilateral
    - (3) Central
  - (C) Fracture-dislocation

**(V) INJURIES OF THE SHOULDER**

- (1) Capsule and tendon injuries
  - (A) Supra-scapular tendinitis
    - (1) Simple strain

- (2) Calcification
- (3) Rupture
  - (a) Complete
  - (b) Incomplete
- (B) Rupture biceps tendon
- (C) Periarthritis and adhesions shoulder
- (2) Bone and joint injuries
  - (A) Fracture clavicle
  - (B) Dislocation sterno-clavicular joint
  - (C) Dislocation acromio-clavicular joint :
    - (1) Subluxation
    - (2) Dislocation
  - (D) Fracture scapula
    - (1) Body
    - (2) Neck
    - (3) Coracoid
  - (E) Fracture humerus
    - (1) Great tuberosity
    - (2) Neck
      - (a) Crack fracture
      - (b) Adduction fracture
      - (c) Abduction fracture
      - (d) Impacted fracture-dislocation
  - (F) Dislocation shoulder
    - (1) Simple
    - (2) With fracture of great tuberosity
    - (3) With avulsion of supraspinatus
    - (4) Recurrent
    - (5) Fracture-dislocation

## (VI) INJURIES OF THE ARM

Fractures shaft of the humerus

## (VII) INJURIES OF THE ELBOW

- (1) Traumatic synovitis elbow
- (2) Tennis elbow
- (3) Fracture head of the radius
  - (A) Crack fracture
  - (B) Marginal fracture with displacement
  - (C) Comminuted fracture
- (4) Fracture capitellum :
  - (A) Bruising of articular cartilage
  - (B) Chip fracture
  - (C) Half fracture
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**(V) INJURIES OF THE SHOULDER :**

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  - (A) **Supra spinatus tendinitis**
    - (1) Simple strain

- (2) Calcification
- (3) Rupture
  - (a) Complete
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- (B) Rupture biceps tendon
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- (2) Bone and joint injuries
  - (A) Fracture clavicle
  - (B) Dislocation sterno-clavicular joint
  - (C) Dislocation acromio-clavicular joint
    - (1) Subluxation
    - (2) Dislocation
  - (D) Fracture scapula
    - (1) Body
    - (2) Neck
    - (3) Coracoid
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- (5) Fracture olecranon

- (6) **Supra-condylar fracture humerus**
  - (A) Supra-condylar
  - (B) Trans-condylar
  - (C) Inter-condylar T and Y
- (7) **Epiphysal injuries at the elbow**
  - (A) Forward dislocation of lower humeral epiphysis
  - (B) Dislocation external condyle epiphysis
  - (C) Dislocation internal condyle epiphysis
  - (D) Dislocation upper radial epiphysis
- (8) **Dislocation of elbow joint**
- (9) **Dislocation of radial head**
- (10) **Fracture-dislocation of the elbow**
  - (A) Fracture coronoid
  - (B) Fracture olecranon
  - (C) Fracture radial head
  - (D) Avulsion of internal epicondyle
  - (E) Fracture condyle

#### (VIII) INJURIES OF THE FOREARM

- (1) **Fracture of the shafts of both the bones**
  - (A) Greenstick and crack
  - (B) Complete
- (2) **Fracture ulnar shaft + dislocation radial head**
- (3) **Fracture radial shaft + dislocation inferior radio-ulnar joint**

#### (IX) INJURIES OF THE WRIST

- (1) **Sprain of the wrist**
  - (A) Traumatic tenosynovitis
  - (B) Tendo-vaginitis stenocans
  - (C) Peritendinous fibrosis
- (2) **Fracture lower end of the radius**
  - (A) Colles fracture
  - (B) Radial styloid fracture
    - (1) Compression
    - (2) Avulsion
  - (C) Posterior marginal fracture
  - (D) Anterior marginal with subluxation of the wrist
- (3) **Ruptures of tendons:**
  - (A) Extensor pollicis longus
  - (B) Flexor pollicis longus
- (4) **Displacement of lower radial epiphysis**
  - (A) Backwards
  - (B) Crushing

## (5) Fracture of the scaphoid

- (A) Tubercle
- (B) Waist
- (C) Proximal pole

## (6) Dislocation of carpal bones

- (A) Semilunar
- (B) Scaphoid
- (C) Perilunar
- (D) Fracture-dislocation of carpus

## (X) INJURIES OF FINGERS AND HAND

## (1) Fracture metacarpals

## (A) Fractures at the base of the thumb

- (1) Base of the metacarpal
- (2) Bennett's fracture-dislocation

## (B) Fractures of the shafts of metacarpals

- (1) Spiral
- (2) Transverse

## (C) Fractures neck of metacarpals

## (2) Dislocation of carpo-metacarpal joints

## (3) Metacarpo-phalangeal sprains and dislocations

## (A) Thumb

- (1) Sprain of the thumb
- (2) Subluxation of the thumb
- (3) Dislocation of first metacarpo-phalangeal joint

## (B) Other metacarpo-phalangeal joints

## (4) Fractures proximal phalanges

## (5) Inter-phalangeal :

- (A) Sprains
- (B) Subluxations
- (C) Dislocations
- (D) Fractures
- (E) Fracture-dislocations

## (6) Mallet finger :

Avulsion of extensor tendon insertion

## (7) Trigger finger

: Avulsion of middle slip of extensor tendon

## (XI) INJURIES OF THE HIP

## (1) Avulsion of epiphysis near hip joint

- (A) Avulsion of lesser trochanter
- (B) Avulsion of greater trochanter
- (C) Avulsion of iliac crest

- (2) **Displacement of upper femoral epiphysis**  
Adolescent epiphysal coxa vara
- (3) **Traumatic dislocation of the hip**
  - (A) Simple
  - (B) Fracture-dislocations
    - (1) Femoral head
    - (2) Femoral neck
    - (3) Femoral shaft upper half
    - (4) Acetabulum
- (4) **Fracture neck of the femur**
  - (A) Abduction fractures  
Impacted subcapital
  - (B) Adduction fractures
    - (1) Subcapital and trans-cervical
    - (2) Inter trochanteric
    - (3) Per trochanteric

## (XII) INJURIES OF THE THIGH

- (1) Sub-trochanteric fracture of the femur
- (2) Fracture shaft of the femur
- (3) Supra-condylar fracture femur
- (4) Displacement of lower femoral epiphysis

## (XIII) INJURIES OF THE KNEE

- (1) **Internal derangements of the knee:**
    - (A) Traumatic synovitis and hæmarthrosis
    - (B) Injuries to the ligaments
      - { (1) Sprains
      - { (2) Ruptures
      - { (3) Avulsions
    - Of { (a) Internal lateral lig
    - { (b) External lateral lig.
    - { (c) Cruciate lig anterior & posterior
  - (C) Dislocation of the knee
  - (D) Fracture tibial spine
  - (E) Injuries to semilunar cartilage
    - (1) Bucket-handle
    - (2) Posterior horn
  - (F) Loose bodies
- (2) **Injuries of the extensor mechanism of the knee:**
  - (A) Avulsion of the quadriceps
  - (B) Rupture quadriceps with fracture patella
  - (C) Avulsion of lig. patella from patella
  - (D) Fracture tibial tubercle or separation of tubercle epiphysis

## (3) Injuries of the patella

## (A) Fracture

- (1) Direct    (a) marginal
- (b) chip

## (2) Indirect

## (B) Dislocation

## (4) Fracture external tuberosity of the tibia

## (A) Depressed

## (B) Comminuted

## (XIV) INJURIES OF THE LEG

## (1) Fractures shaft of the leg bones

## (A) Without overriding

## (II) With overriding

## (C) Compound

## (D) Infected

## (E) Ununited

## (F) Synostosed

## (XV) INJURIES OF THE ANKLE

## (1) Sprain of the ankle

## (2) Subluxation or dislocation of the ankle

## (3) Dislocation of peroneal tendons

## (4) Sprain and rupture of internal lateral ligament

## (5) Fractures and fracture-dislocations

## (A) Abduction-external rotation Pott or Depuytren

## (1) Fracture external malleolus

## (2) Fracture external malleolus

+ Avulsion internal ligament or malleolus

+ Outward dislocation of astragalus

## (3) Fracture external malleolus

+ Avulsion internal ligament or malleolus

+ Posterior marginal fracture tibia

+ Dislocation astragalus

(a) Outward

+ (b) Backward

## (B) Adduction

## (1) Fracture internal malleolus

## (2) Fracture internal malleolus

+ Avulsion external ligament or malleolus

+ Inward dislocation of astragalus

## (3) Fracture internal malleolus

+ Avulsion external ligament or malleolus

+ Posterior marginal fracture tibia

+ Dislocation astragalus

(a) Inward

+ (b) Backward

**(C) Vertical compression**

- Anterior marginal fracture tibia
- + Forward dislocation astragalus
- + Comminution tibia and malleoli

**(D) Compound injuries****(6) Epiphyseal injuries**

- (A) Abduction + external rotation tibial epiphysis
- (B) Adduction

**(XVI) INJURIES OF THE FOOT****(1) Adhesions of the foot**

- (A) After fractures or dislocations of the foot
- (B) After fractures of the leg
- (C) After arthrodesis
- (D) After flat foot

**(2) Fracture of calcis :**

- (A) Isolated and uncomplicated
  - (1) Vertical fracture of tuberosity
  - (2) Horizontal fracture of tuberosity
  - (3) Sustentaculum tali
- (B) Comminuted fracture with minimal joint injury
  - (1) Fissure fractures
  - (2) Fracture outer wall and body
- (C) Comminuted fracture with severe joint injury
  - (1) Fracture outer wall and body
  - + (2) Crushing of
    - (a) Outer part of post-articular surface
    - (b) Whole posterior articular surface
    - (c) Anterior articular surface

**(3) Fractures and dislocations of astragalus :**

- (A) Fracture trigonal process
- (B) Avulsion capsule from the astragular neck
- (C) Dislocation astragalus
- (D) Fracture neck of the astragalus

**(4) Subastragaloid midtarsal dislocations and fracture-dislocations :**

- (A) Subastragaloid fracture-dislocation
- (B) Subastragaloid midtarsal dislocation
- (C) Midtarsal dislocation

**(5) Fracture tarsal scaphoid**

- (A) Kohler's disease
- (B) Tuberosity
- (C) Crush fractures
- (D) Fracture-dislocations

- (6) **Fracture metatarsals**
  - (A) Avulsion fracture base of the 5th
  - (B) March fractures
  - (C) Fractures neck of the metatarsals
- (7) **Fracture of the toes**
  - (A) Proximal phalanges
  - (B) Comminuted
  - (C) Open

## AMPUTATIONS AND DISARTICULATIONS

- Amputation** Removal of a limb by division of bone
- Disarticulation** Removal of a limb by division through a joint
- Objects**
- (1) **Removal of a pathological condition**
  - (2) **Good functioning stump**
    - (A) Suitable length
    - (B) Good scar non-adherent non irritable
    - (C) Good muscles
    - (D) Good bone non-adherent, well covered
    - (E) Good joint painless and full movements
    - (F) Good nerves non-adherent no neuritis
    - (G) Good circulation
  - (3) **Easy wear of artificial limb**
    - (A) **Weight bearing** Lower limb
      - (1) End bearing Symes, Stokes-Gritti
      - (2) Proximal and lateral bearing
        - (a) Midleg
        - (b) Supra-condylar
    - (B) **Transmitting** Upper limb

### Indications

- (1) Primary immediate amputation
- (2) Preliminary treatment + conservative operations  
↓ Secondary amputation lower down
- (3) Expectant and conservative treatment  
↓ Secondary unavoidable amputation

### Varieties

- (1) **Amputation of election :**  
Classical amputation
- (2) **Urgent or guillotine :**  
Ind Urgent general condition  
Tech Division of skin, muscles and bone at one level  
After treat Re-amputation higher up



(3) **Flapless amputation**

Ind (1) Urgent general condition

(2) Urgent local condition

(a) Bad trauma

(b) Infections

(c) Gangrene

Tech (a) Amputate at lowest level

(b) Avoid straight section

(c) Save as much skin as possible if at critical level

(d) Division skin → soft tiss. → bone  
At the level of retraction of the predecessor

After treat (a) Flap extension by traction

(α) Suture traction

(β) Adhesive traction

(b) Re-amputation if required

(4) **Open flap amputation**

Ind (1) Trauma

(2) Infections (a) Pyogenic

(b) Anaerobic

Tech (a) Stitch the flaps back

(b) Magdolph glycerine dressings

(c) Secondary sutures of flaps

(5) **Sleeve amputation**Ind Compound fracture near the lower end of  
a long bone with peripheral gangreneTech (a) Amputation by guillotine method at  
the lower end of the bone(b) Dissection and excision of the lower  
fractured fragment

(c) Leave the soft tissue sleeve open

(6) **Kineplastic amputation :**Def Amputation designed to have direct  
control over mechanical contrivances  
without the use of an artificial limbTech Preservation of antagonistic action by  
suturing muscles together at the end  
of the stump

Methods (a) Club motor

Bulbous projecting knob of muscles or  
tendons at the junction of opposing  
muscle groups and covered with skin  
to which cords of prosthesis are attached  
by a ring.The movements of the club give move-  
ments of the artificial limb.

- (b) Loop motor
  - 1 Loop of tendons formed from the opposing muscles with opening at the centre.
- (c) Tunnel motor
  - (A) Tendon tunnel
  - (B) Muscle tunnel

Pedicled skin tunnel flap which passes under the tendon or muscle and through which a metal rod is passed.
- (d) Pseudarthrosis motor
  - Separation and mobilisation of terminal portion of the bone to which opposing muscles are attached and formation of pseudarthrosis.

### *Stages of treatment*

- (1) **Preoperative**
  - (a) **Specific**
    - (α) Insulin in diabetes
    - (β) Sera in gas gangrene
  - (b) **Supportive**
    - (α) Blood transfusion
    - (β) Glucose saline
  - (c) **Preventive** Anti coagulants
  - (d) **Conservative**
    - (α) Main vein ligation
    - (β) Periaxillary sympathectomy
    - (γ) Embolectomy
- (2) **Operation**
  - (a) Determination of level
  - (b) Determination of type of flaps
  - (c) Closed or open
- (3) **Surgical after treatment**
  - (a) Prevention or treatment of infection
  - (b) Prevention of soft tissue retraction
- (4) **Treatment of the stump**
  - (a) Treatment of sinuses and ulcers
  - (b) Restoration of joint function
  - (c) Restoration of muscle function
  - (d) Restoration of normal circulation

Tech (1) Massage active exercises, physiotherapy

(2) Temporary appliances
- (5) **Permanent prosthesis**
  - Ind (a) Disappearance of stump sense
  - (b) Attainment of maximum shrinkage

- (c) Satisfactory mobility
- (d) Complete wound healing
- (6) Functional and vocational re-education  
Development of remaining limb

### *Technique*

- (1) *Hæmostatic control*

### *Methods*

#### (A) Tourniquet

Contraind (a) Vascular diseases

(b) Root disarticulations

Tech (a) Application after emptying of  
the limb, unless for sepsis  
(b) Application over a towel

Removal (A) Early

(a) Ligature of main vessels

↓ (β) Removal of tourniquet

↓ (γ) Deliberate branch ligatures

↓ (δ) Closure of the wound

(B) Late

(a) Closure of the wound

↓ (β) Pressure bandage

↓ (γ) Removal of tourniquet

#### (B) Pressure on main artery :

Ind (1) Vascular diseases

(2) Root disarticulations

Tech (a) Digital pressure

(b) Temporary clamps

#### (C) Preliminary first-stop ligature of main vessels

- (2) *Determination of level*

(A) Get clear of the pathology

(B) Levels as regards prosthesis

(1) Upper extremity

(a) *Digits*

Thumb save at all costs

One finger whole can be sacrificed

Multiple fingers save proximal digits

(b) *Hand* Metacarpal region : good level

(c) *Wrist* Bad level

(a) *Stump too long*

(β) No pronation and supination

**(d) Forearm****(a) Optimum**

- (i) Junction of lower and mid. third
- (ii) 8 in. from the olecranon tip

**(β) Critical**

5 inches from the olecranon tip

**(e) Elbow Bad level**

Bulbous tender irregular stump

**(f) Arm****(a) Optimum**

- (i) Supra-condylar
- (ii) 8 in. from the axillary fold

**(β) Critical**

4 inches from the axillary fold

**(g) Shoulder****(a) If appliance is not to be worn**

Leave the humeral head in

**(β) If appliance is to be worn**

Excise the humeral head

**(2) Lower extremity****(a) Digits**

Great toe save prox. phalanx if possible

Other toes disarticulate at metatarsal heads

**(b) Tarso-metatarsal Lisfranc**

Good level

Planter flap necessary

**(c) Tarsal and midtarsal Bad level**

All partial amputations post. to tarso-metatarsal joints are unsatisfactory

**(a) Chopart unstable, painful deformed****(β) Pirogoff too long bony non-union****(d) Syme's**

Through the malleoli just above the articular surface of the ankle joint.

**(1) Good for function Laborious work**

- (2) Painful muscular spasms
- (3) Ascending pathology gas gangrene
- (4) Infection

**(B) Chronic**

- (1) **Skin** Furunculosis, eczema, ulcer  
 Treat (a) Skin hygiene  
       (b) Discontinue artificial limb  
       (c) Paint 1% silver nitrate in 50% alcohol

- (2) **Scar**

- (a) Irritable scar
- (b) **Weak scar** Ulcerated scar  
 Etio (a) Trauma  
       (b) Infection  
       (c) Vascular impairment
- (c) **Hypertrophied scar** keloid
- (d) **Adherent scar**
- (e) **Infected scar**
- Treat (1) Excision of the scar  
       (2) Shortening the bone  
       (3) Plastic operation on skin

- (3) **Nerve**

- (a) **Painful pseudo-neurofibroma** :  
 Path : Regenerative overgrowth of cut end of  
       a nerve, due to non-crushing  
 Clinic Local pressure pain  
 Treat Excision of the bulb

- (b) **Adherent nerve**

- Etio Implication in scar due to non-retraction  
       after cutting
- Clinic Persistent painful stump
- Treat (a) Under-cutting  
       (b) Higher nerve interruption  
       (c) Neurolysis

- (c) **Ascending neuritis : Causalgia**

- Etio Infection involving sensory nerve endings
- Sites : (a) Shoulder disarticulation  
       (b) Infected stump
- Clinic Causalgia  
       (a) Intractable neuralgia } ascending  
       (b) Trophic phenomena }  
- Treat (a) Higher nerve interruption  
       (b) Sympathectomy  
           (a) Periaxial  
           (b) / tomy

**(d) Phantom limb**

Path No organic lesion  
 Clinic Sensations of absent limb

**(4) Bone****(a) Spur formation**

Etio (a) Bone infection  
 (β) Periosteal injury  
 (γ) Haemorrhage  
 (δ) Bone chips

Clinic Bony swelling with irritation of the stump end

Treat (a) Prophylactic  
 (1) High cutting of periosteum and muscle insertions  
 (2) Curette the bone marrow  
 (3) Protection of the soft tissues at the time of sawing  
 (β) Curative  
 (1) Excision  
 (2) Re-amputation higher up

**(b) Osteomyelitis of the bone stump**

Path Ring necrosis  
 Clinic (a) Non healing  
 (β) Sinus  
 Treat (a) Incision and drainage  
 (b) Curettage  
 (c) Sequestrectomy  
 (d) Local resection

**(5) Muscle**

(a) Contractures  
 (b) Adhesions and fibrosis  
 (c) Wasting

**(6) Bursae**

Path Bursitis or bunion  
 Site Over the head of the fibula  
 Treat Resection of the fibula

**(7) Joint Ankylosis**

Etio (a) Intra-articular  
 (b) Extra-articular muscle contractures  
 Clinic (1) Flexion knee  
 (2) Flexion hip  
 (3) Flexion elbow  
     with loss of pronation and supination  
 (4) Adduction shoulder  
     with loss of abduction and eversion

- Treat (1) Physiotherapy  
 (2) Exercises  
 (3) Tenotomies

(8) **Vasomotor disturbances**

- (a) Cold trophic stump  
 (b) Irritable hyperæmic stump  
 (c) Causalgia

(9) **Improper amputations**

(A) **Improper level**

- (a) Partial amputation of the foot  
 (b) Amputation lower third of the leg  
 (c) Amputation lower third of the forearm

(B) **Improper techniques**

- (a) Loose flaps  
 (b) Bad bone sections  
 (c) Conical stump

Etio (a) Growth of bone in children

Treat Delay the re-amputation—till adolescence

Ample soft tissue covering

(b) Retraction of soft tissues

Treat Adhesive extension

Higher re-amputation

*Secondary operations on amputation stumps*

- Time (1) Good general condition  
 (2) Absence of local œdema or induration

**Operations**

(1) **Plastic closure**

- Ind Amputation at (a) Optimum level  
 (b) Critical level

Contraind Osteomyelitis of the stump

Tech Excision of scar and ulcerated area

↓ Mobilisation of skin flaps

↓ Plastic closure

(2) **Plastic resection**

- Ind: (a) End osteomyelitis  
 (b) Terminal osteophytes  
 (c) Conical stump

Tech: Excision of scar sinuses and infected bone

↓ Plastic closure

(3) **Re-amputation**

- Ind (a) Amputation at unsuitable level  
 (b) Infection or gangrene  
 (c) Conical stump

### Individual amputations and disarticulations

(1) SUPERIOR EXTREMITY

(1) **Amputation of fingers**

- |     |                         |  |
|-----|-------------------------|--|
| Ind | (a) Trauma              | (a) Primary within 24 hours                |
|     |                         | (β) Secondary if infection                 |
|     | (b) Sepsis              | (α) Acute with septicaemia                 |
|     |                         | (β) Sequelæ mal-ankylosis<br>osteomyelitis |
|     | (c) Vascular impairment | gangrene                                   |

- |       |     |        |                  |
|-------|-----|--------|------------------|
| Flaps | (1) | Thumb  | palmar or radial |
|       | (2) | Index  | radial           |
|       | (3) | Middle | } equal          |
|       | (4) | Ring   |                  |
|       | (5) | Little | ulnar            |

Amputation of a digit should be done with a long palmar flap.

## Site

- |                      |                                 |
|----------------------|---------------------------------|
| (A) Terminal phalanx | } Palmar flap by transfixion    |
| (B) Second phalanx   |                                 |
| (C) First phalanx    |                                 |
|                      | (a) Any suitable flap           |
|                      | (b) Cut short the nerves        |
|                      | (c) Suture the tendons together |

- Points (a) It is not necessary to remove cartilage in disarticulations  
(b) If amputation is proximal to the middle of the second phalanx, flexor and extensor tendons must be sutured together  
(c) Flapless method is not advised in fingers

- After treat (1) Splinting should not be done for more than a week  
(2) Early function is the key note of success in digital amputations

(D) Metacarpo-phalangeal disarticulation

Ind Labourers good grip

- Tech (1) Racquet incision with oval distal to the joint
- (a) Flaps
    - (a) Thumb long palmar
    - (b) Index long radial
    - (c) Little long ulnar
  - (b) Dorsal metacarpal incision
    - (a) Index on the ulnar side
    - (b) Little on the radial side
    - (c) Others over the metacarpals
- (2) Cut short the tendons
- (3) Treat the digital arteries and



**(E) Amputation at the metacarpal necks**

Ind Cosmetic loss of finger not noticeable

Tech As in (D) + removal of metacarpal head

**(F) Amputation of finger with metacarpus :**Ind (a) Fracture metacarpus  
+ Injured flexor tendons

(b) T. B.

(c) Osteomyelitis

Tech (1) Racquet incision

(2) Dorsal approach

(a) Extensor tendons

↓ (b) Subperiosteal bone excision

↓ (c) Flexor tendons

**(G) Amputation of the thumb**

(a) Avoid at all costs

(b) Conserve as much bone as possible

(c) Preserve or re-attach muscle insertions

(d) Palmar or radial flap

Thumb replacement methods

(1) Digitalising first metacarpal

(2) Nicoladoni transfer of great toe

(3) Albee two stage (a) Tibial bone-graft  
↓ (b) Skin-graft**(2) Amputations near the wrist :****(A) Amputations through the carpus and metacarpus**

Ind (a) Mobile wrist joint

(b) Good for mechanism of artificial hand

**(B) Disarticulation of the wrist Bad level**

Ind (a) Severe trauma to the hand

(b) Extensive sepsis in carpus and metacarpus

Disadvant Stump too long

Advantage Pronation and supination possible

Tech (1) Single palmar flap

(a) Exclusive skin and fascia

or (b) Inclusive muscles

(2) Disarticulation from dorsum

(3) Excision of styloids

(4) Tendons cut short or sutured

(5) Vessels and nerves treatment

(6) Suture

**(3) Amputations through the forearm :**

Ind (a) Extensive trauma to hand and wrist

(b) Advanced T. B. wrist

(c) Gangrene or acute sepsis hand

(d) Recurrent giant-cell tumour lower end radius

- Level (a) **Optimum**  
 (a) Junction of middle and lower third  
 (b) 8 inches from olecranon tip  
 (r) 5 inches from biceps insertion
- (b) **Critical**  
 (a) 5 inches from olecranon tip  
 (b) 2 inches from biceps insertion
- Tech (1) Flap equal antero-posterior  
 (2) Free stripping of periosteum  
 (3) Vessels (a) Radial  
                   (b) Ulnar  
                   (c) Interosseous  
 (4) Nerves (a) Radial  
                   (b) Median  
                   (c) Ulnar  
 (5) Suture muscle-ends over and in between the bone-ends

After treat Fixation in supination

Compl : Fusion of bone-ends

(4) **Disarticulation at the elbow**

- Ind (a) Extensive injuries of the forearm  
 (b) Infection and gangrene

Advantage Better hold for artificial limb

Disadvantage Sensitive, irregular bulbous end

- Tech (1) Flap  
           (a) Circular  
               3 finger breadth below joint line  
           (b) Elliptical  
           (c) Posterior flap  
 (2) Division of soft tissues  
 (3) Disarticulation  
       from anterior and outer aspect  
 (4) Treatment of vessels, nerves, muscles  
 (5) Closure

(5) **Amputation through the arm**

- Ind (a) Severe trauma  
 (b) Severe sepsis or gangrene  
 (c) Advanced T. B. elbow  
 (d) Neoplasms

- Levels (1) **Optimum**  
           (a) Supracondylar  
           (b) 1 inch above the epicondyles  
           (c) 8 inches from the axillary fold  
 (2) **Critical** 4 inches from the axillary fol

**Tech (A) Amputation arm supra-condylar**

- (1) Flap
  - (a) Anterior to antecubital fold
  - (b) Posterior 5 inches below olecranon
- (2) Division of tendons
  - (a) Biceps at the level of elbow
  - (b) Triceps at the insertion
- (3) Division of all soft tissues
 

Upto the bone

At the level of bone section
- (4) Bone section
 

One inch above the epicondyle

Remove the supra-condylar ridges
- (5) Ligature of brachial vessels
- (6) Nerves median radial ulnar musculocutaneous.
- (7) Haemostasis
- (8) Tendino-plastic biceps with triceps
- (9) Closure.

**(B) Amputation through critical level of arm :**

- (1) Racquet flap incisions
 

Vertical Along delto-pectoral split

Lateral Deltoid flap

Medial One inch below axilla
- or (1) Circular method
- (2) Ligature of brachial vessels
- (3) Bone section below surgical neck
- (4) Treatment of vessels and nerves
- (5) Muscle suture deltoid medial muscles
- (6) Closure

**(6) Disarticulation at shoulder joint**

- Ind** (a) Extensive trauma to humeral head
- (b) Malignant tumour of the humerus
- (c) Complete brachial plexus paralysis

**(A) Spence's method Anterior racquet**

- (1) Incisions
  - (a) Vertical incision
 

Along the delto-pectoral interval

From coracoid downwards
  - + (b) Circular incision at the axillary folds
- (2) Dissection of internal flap
- (3) Division of soft structures
  - (a) Vessels
  - (b) Nerves
  - (c) Muscles
- (4) Dissection of external flap with deltoid

## (5) Disarticulation from anterior aspect

- (a) Open the capsule anteriorly
- (b) Division of both heads of biceps
- (c) Division of tuberosity muscles
- (d) Removal of the humerus

## (6) Closure

## (B) Furnaux-Jordan method

High circular arm amputation

↓ Dissection of humeral head

## (7) Fore-quarter interscapulo thoracic disarticulation of Berger

Ind (1) Sarcoma of the shoulder or scapula

(2) Intractable and unbearable neuralgia and paralysis due to malignant infiltration of brachial plexus.

(3) Brawny arm of carcinoma breast

## (A) Superior

(a) Incision along the upper border of inner two-thirds of clavicle

(b) Division at the middle of the clavicle

(c) Exposure and ligature of vessels and nerves

## ↓ (B) Anterior

(a) Incision coracoid → anterior axillary fold  
→ axilla → inferior scapular angle

(b) Dissection of anterior flap

(c) Division of pect. major near the thorax

(d) Dissection of axilla

## ↓ (C) Posterior

(a) Incision outer end of the clavicle

↓ inferior angle of the scapula

(b) Dissection of posterior flap

(c) Division of scapulo-vertebral muscles

## ↓ (D) Removal of the limb

## ↓ (E) Closure with drainage

## (II) INFERIOR EXTREMITY

## (1) Amputation of toes

## (A) Terminal phalanx

Ind (a) Deformity

+ (b) Painful corn or ulcer or nail

Tech Single plantar flap

## (B) Partial amputations undesirable except in hallux

## (C) Metatarso-phalangeal disarticulation

Ind Any amputation proximal to distal phalar  
except in hallux

Tech Racquet incision with dorsal handle

(1) **Hallux**

- Tech (a) Racquet incision  
           (a) Handle on outer side  
           (β) Medio-plantar flap bigger  
           (b) Preserve first phalangeal base  
           (c) Suture the tendons over the bone

(2) **Little toe**

- Tech Racquet incision  
           (a) Handle on inner side  
           (β) Latero-plantar flap

(3) **Any three toes amputation**

- Remove all toes  
 Remove fifth metatarsal head

(2) **Amputations through the foot**(A) **Through the metatarses**

- Excision of the head of the metatarsus with the toe results in impairment of function especially in first metatarsal.

(B) **Through the tarso-metatarsus**

- (1) Lisfranc Disarticulation through tarso-metatarsal joints  
 (2) Hey: Lisfranc with amputation of second metatarsal base  
 (3) Skey

- Def Disarticulation of outer three metatarsals  
 + Amputation through inner bones

Level Good for heavy laborious work

Tech Long plantar flap

(C) **Through the tarsus :**

- : Chopart Def Disarticulation at midtarsal joints  
 Level Bad (a) Unstable, painful stump  
           (b) Equino-varus contracture

Tech Long plantar flap

(3) **Amputation at the ankle joint**(A) **Symes**

- Def Supra-malleolar amputation through the lower ends of the tibia and fibula just above the ankle joint with heel flap

- Level (a) Good for function  
       (b) Bad for cosmetics

- Advantages (a) Direct weight bearing  
               (b) Maximum leverage power  
               (c) Less mutilating  
               (d) Permits appliance

Disadvantage Unsightly bulbosity

Ind Hard laborious working people

Contraind Where cosmetic results are required

- Tech** (1) Incision  
 (a) Half inch below the int. malleolus  
 ↓ (b) One inch in front of the heel  
 ↓ (c) Tip of ext. malleolus  
 ↓ (d) Across the front of the joint  
 (2) Division of soft tissues upto capsule and bone  
 (3) Disarticulation  
 (a) Anterior ligaments  
 (b) Lateral ligaments  
 (c) Posterior ligaments  
 (d) Tendo achillis  
 (4) Dissection of os calcis  
 Strip off tendo Achillis and fat  
 (5) Removal of lower ends of leg bones  
 (a) Half to three-fourth inch above the articular surface  
 (b) At right angles to long axis  
 (6) Ligature and treat. of vessels, nerves, tendons  
 (a) Keep post. tibial artery as long as possible  
 (b) Cut the tendons short  
 (7) Closure with drainage  
 Trim the flap carefully
- After-treat** (1) Walking in six weeks  
 (2) Elephant boot
- Complications** (a) Callosities  
 (b) Neuritis  
 (c) Circulatory failure } After 8-10 years  
 Treat Re-amputation

### Modified Symes

- Advant** (1) Good cosmetics : no bulbous end  
 (2) Good artificial limb

- Tech** (1) Oval flap from the crease on the anterior aspect of junction of the foot and the leg across the tips of the malleoli, to about one inch on the sole  
 (2) Dissection of all the soft parts from above downwards with the knife against the bone  
 (3) Bone section  $\frac{3}{4}$  to 1 inch above the articular surfaces of tibia and fibula

(B) Pirogoff: Syme's with conservation of a part of os calcis osteoplastic

(C) Watson Syme's with conservation of whole of os calcis osteoplastic

**(4) Amputation through the leg****Level (1) Optimum**

- (a) Mid leg
- (b) 7 inches from the upper art. surface of tibia
- (c) Stump should project beyond the thigh at the back when flexed to a right angle

**(2) Critical**

- (a) 3 inches from the upper art. surface of tibia
- (b) 2 inches from biceps insertion

**(A) Mid leg or optimum level amputation****(a) Incision**

- (a) Single anterior flap
- (b) Long anterior + short posterior flaps

**(b) Muscles**

- (a) Cut the posterior muscles at the level of bone section
- (b) Cut gastrocnemius three inches below

**(c) Bones**

- (a) Fibula cut first 5-1 inch above
- (b) Tibia division with smoothing

**(d) Vessels & nerves ligature**

- (a) Vessels ant. & post. tibials peroneal
- (b) Nerves anterior and posterior tibials  
musculocutaneous  
posterior saphenous

**(e) Tendo-plastic technic**

Suture of gastrocnemius

**(f) Suture and closure****(g) After treat**

- (a) Knee fixed in extension
- (b) Art. limb

Pressure taken by head of the tibia and lower border of patella

**(B) Upper third or critical level amputation :**

- (a) Lateral equal flaps
- (b) Total removal of fibula

**(C) Amputation leg above the critical level :**

- (a) Amputate above the knee
- or (b) Peg leg with flexed knee

**(5) Amputations round about the knee****(A) Disarticulation at the knee Stephen Smith****Advant (a) Urgent life saving measure**

- (b) Accustomed to bear weight on the anterior surface of fully flexed knee

- Disadvant** (a) Bulbous end  
(b) Good artificial limb cannot be fitted
- Tech** (a) Flaps (a) Lateral  
(b) Division of (b) Single anterior  
(a) ligament patella  
(b) lateral ligaments  
(c) cruciate ligaments  
(d) capsule  
(c) Ligature of vessels and nerves  
(d) Leave in the semilunar cartilages
- (B) Condylar Amputations:
- (1) Carden Amputation at the level of adductor tubercle covered by anterior flap containing patella
- (2) Tendino-plastic  
Def Amputation slightly above the adductor tubercle covered by quadriceps tendon  
Tech Anterior flap upto middle of the patella
- (3) Stokes-Gritti:  
Def Amputation slightly above the adductor tubercle with ankylosis of lower cut end with patella  
Level Amputation of choice  
Advantage Perfect end bearing stump
- Tech** (1) Long anterior flap  
From just above the adductor tubercle to tibial tubercle  
Consisting of skin, patella, tendon and capsule  
(2) Division of soft tissues upto bone  
(3) Periosteal and bone section  
One inch above the adductor tubercle  
(4) Freshening of patellar surface  
(5) Dissection of supra-patellar synovial pouch  
(6) Vessels and nerves  
(a) Popliteal vessels  
(b) Nerves ext. and int. popliteal saphenous  
(7) Suture of patella to femoral end
- After-treat** (1) Dressings  
(2) End pressure exercises  
(3) Temporary prosthesis at the end of 4 weeks
- (6) Amputations through the thigh
- Ind** (1) Trauma  
(2) Gangrene foot or leg  
(3) Acute infections  
(4) T.B. knee  
(5) Malignancy below the knee
- Levels** (A) Optimum 10 to 11 inches from the perineum  
(B) Critical (a) Junc. of upper and mid. third  
(b) 4 inches from the perineum



**(A) Optimum level or supra-condylar amputation**

- (1) Any flap—(Diameter of cross-section)  
Usually antero-posterior
- (2) Division of soft tissues  
Hamstrings and adductors lower the quadriceps
- (3) Division and stripping of periosteum
- (4) Division of bone  
(a) 10–11 inches from the perineum  
or (b) 2½–3 inches above the knee
- (5) Vessels and nerves  
(a) Vessels femoral artery  
profunda femoris artery  
saphenous vein  
(b) Nerves sciatic  
saphenous  
external and internal cutan
- (6) Suture of hamstrings to quadriceps
- (7) Closure with drainage

After treat Prevent flexion contracture of the hip

**(B) Critical level or mid-thigh amputation**

- (a) Flaps  
(a) Anterior 6 inches more than posterior  
or (β) Antero-lateral } equal flaps  
Postero-medial }
- (b) Suture anterior and posterior muscles the stump
- (c) Avoid spur formation

After treat (1) Prevent flexion contracture of hip

(2) Pylon for 6 months

(3) Artificial limb

Metal or wood bucket, attached by sides to leg and foot pieces, with movable joint

**(7) Disarticulation at the hip Joint :**

- Ind (1) Extensive trauma  
(2) Extensive necrosis of femur  
(3) Ascending gas gangrene  
(4) T. B. hip with suppuration  
(5) Sarcoma of the femur  
(6) Flail limb  
+ (7) General health good

Prooper (a) Blood or saline transfusion

(b) Control of hæmorrhage

+ (a) Tight Esmarch bandage from toes to ration field

↓ (β) Clamp before ligation

- or (r) Digital or instrumental pressure
- or (s) Preliminary ligature

(A) Anterior racquet method

Long postero-medial flap

(B) Posterior flap Fitz Maurice Kelly

- (a) Incision anterior parallel with Poupart
- (b) Preliminary clamping of vessels and nerves
- (c) Posterior skin flap length=diameter
- (d) Division of soft tissues upto the joint
  - (a) Antero-lateral muscles
  - (b) Trochanteric muscles
  - (r) Iliopsoas and pectineus
- (e) Capsulotomy and
  - (a) Disarticulation
  - or (b) Trans-cervical amputation
- (f) Division of postero-medial muscles
- (g) Ligature of
  - (a) Vessels external iliac
  - (b) Nerves femoral
  - sciatic
  - small sciatic
  - obturator
  - gluteal
- (h) Suture with drainage

(C) Furnaux Jordan

- (a) Incision
  - (a) Circular at the junction of upper and middle third
  - (b) Outer vertical over the great trochanter
- (b) Amputation at the level of circular incision
- (c) Dissection of the upper part of the femur
- (d) Closure

(D) Hamilton Bailey

- (a) Incision vertical over the femoral vessels from Poupart downwards
- (b) Ligature of femoral vessels
- (c) Circular incision
  - (a) 4 inches below the perineum
  - (b) Below the trochanter major base
  - (r) Below the fold of the buttock
- (d) Dissection of skin and fascia
- (e) Division of muscles upto the bone
- (f) Capsulotomy
- (g) Dislocation of femoral head
  - or Osteotomy of femoral neck
- (h) Closure with trimming of flaps

Artificial limb 'Tilting table limb with thigh leg and foot pieces hinged together and with pelvic and shoulder bands.

(8) Hind-quarter or Inter-trochantero-abdominal;

Ind Tumours of (a) Innominata

(b) Upper end of the femur

Tech (a) Preliminary blood transfusion

(b) Preliminary control of external iliac vessels

(c) Efficient nerve block

(d) Division of symphysis pubis

(e) Sawing through dorsum illi near the sacro-iliac joint

## IMPORTANT POINTS

- (1) Primary amputations or those delayed only for 24 to 48 hours should be performed as nearly as possible at the seat of injury by simple section of the soft parts or with slight trimming of the bone.
- (2) Amputations for infection should be performed by simple cross section or with very short flaps fixed in eversion.
- (3) For above-knee amputations the length of the functioning stump for limb-fitting purposes should be taken from the perineum.
- (4) For below knee amputations the limit of useful length is that amount of stump which can be retained in the below knee socket when the knee is flexed to 90 degrees.
- (5) Length of the below-knee stump available for fitting of the socket is to be measured from the lower border of the biceps tendon with knee in right angled flexion.
- (6) Length of the forearm stump for fitting an appliance is measured from the insertion of biceps tendon, with elbow at right angles, and must be 5 to 6 inches below that point.
- (7) Where as in the lower limb it is often advisable to sacrifice unnecessary length in order to preserve a good weight bearing stump, in the upper limb length should be preserved at all costs.
- (8) Average time for shrinking of the stump is three months.
- (9) Prosthetic appliances are not extensively used in cases of amputations of the upper extremity as the work of the hand cannot be substituted by any appliance. In lower limb, always secure a stump suitable for prosthesis.
- (10) Total length of the flap or flaps should be a bit more than the diameter of the limb at the level of the bone section. Flaps should fit the bone-ends snugly—not too tight not too loose.

- (11) Subcutaneous tissues and deep fascia always, and muscles and sesamoid bones sometimes should be included in flaps.
- (12) Terminal scar is better in the upper extremity while a posterior scar is more desirable in the lower limb. Scar should always be situated in the region of minimum pressure and irritation.
- (13) End bearing stumps
  - (a) Syme
  - (b) Stokes-Gritti
  - (c) Supra-condylar tendino-plastic amputation of thigh
- (14) In the lower limb, stump must be weight bearing. In the upper limb, stump must be mobile.
- (15) No artificial limb should be worn till irritation cedema or infection of the stump is fully eradicated.
- (16) Any appliance for an amputation stump should not be accepted by a patient, until it has been tried on in the presence of and is approved by the surgeon.
- (17) Aperiosteal technique should not be followed in infected or open amputations, for fear of necrosis.
- (18) Injection of absolute alcohol in the nerve one inch above the plane of section is more successful in preventing neuroma formation than any other method.
- (19) Nerve syndrome in amputation stumps
  - (a) Local pain and tenderness
  - (b) Distal phantom limb
  - (c) Proximal causalgia ascending neuralgia
- (20) There is no single factor as important as traction in the after treatment of amputation wounds and it should be employed whenever there is slightest indication for it viz.
  - (a) Tension on sutures
  - (b) Retraction of flaps
  - (c) Infection.
- (21) Toes
  - (a) Always preserve first phalangeal base in amputations of hallux.
  - (b) Do not excise heads of first and last metatarsals.
  - (c) Amputation of 2nd and 3rd toe is followed by hallux valgus.
- (22) Lisfranc is the only partial amputation of the foot that should ever be performed.
- (23) When amputation of the foot is required and Lisfranc is impossible, the choice should lie between
  - (a) Syme's amputation
  - (b) Midleg or site-of-election amputation.

- (24) Syme's amputation is the best weight bearing stump amputation in the lower extremity but can only be done when the skin of the heel is healthy
- (25) Average life of Syme's amputation is 8 to 10 years, after which re-amputation is needed.
- (26) In every amputation of the lower leg fibula should be cut one inch above the tibia. In short stumps, excise the whole of the fibula.
- (27) Most common fault in disarticulation of the hip joint is redundancy of soft tissues the chief complication is hemorrhage, which is prevented by preliminary ligature of common femoral art.
- (28) Pre-operative tight Esmarch's bandage from the toes to the operation area saves as much blood as can be gained by moderate transfusion.
- (29) **Fingers**
  - (a) Preserve thumb at all costs
  - (b) Any portion of a finger is worth retaining provided remaining joints are mobile.
  - (c) *Aesthetic purposes* excise metacarpal head.  
*Functional purposes* leave in metacarpal head.
  - (d) If the amputation of a digit is proximal to the middle of the second phalanx flexors and extensors must be sutured together
  - (e) Avoid any scar on palmar aspect.
- (30) Advantage of disarticulation at the wrist over amputation at a higher level is that pronation and supination are possible the disadvantage being the long stump.
- (31) In cases of crush trauma to the hand trim and clean up as thoroughly as possible, but do not remove any part that has chance to survive.
- (32) No part of hand should ever be removed merely to obtain skin closure. It may be left to granulate or be skin-grafted.
- (33) No amputation of the forearm should be done at a level which leaves less than 2 inches of ulna.
- (34) Prevent fusion of bone stumps in amputations through the forearm.
- (35) Amputation of forearm should be done below the insertion of pronator teres, with at least 3 inches of ulna in the stump.
- (36) It is inadvisable to perform elbow disarticulation in malignancy of the forearm.
- (37) In amputations through the arm, the longer the stump the greater the control of artificial limb.

- (38) Disarticulation of the shoulder is better when prosthesis is used amputation through the upper third of the arm is better when prosthesis is not used.
- (39) Different positions during amputations
- (1) Leg flexion of the knee.
  - (2) Thigh flexion of the hip.
  - (3) Forearm (a) extension of the elbow  
(b) supination of the forearm.
  - (4) Elbow (a) flexion to right angle.  
(b) supination of the forearm.
  - (5) Arm abduction to right angle.
  - (6) Shoulder (a) abduction to right angle.  
(b) eversion.
- (40) Good levels
- (1) Base first phalanx of the hallux.
  - (2) Lisfranc.
  - (3) Syme.
  - (4) Midleg 7 inches from upper tibial articular surface.
  - (5) Stokes-Gritti.
  - (6) Supra-condylar tendino-plastic 10 to 11 inches from the perineum.
  - (7) Disarticulation hip.
  - (8) Metacarpal region of the hand.
  - (9) Junction of middle and lower third of forearm  
8 inches from olecranon tip.
  - (10) Supra-condylar humeral  
8 inches from axillary fold.
- (41) Bad levels
- (1) Excision of heads of first or fifth metatarsals.
  - (2) Chopart.
  - (3) Lower third of the leg
  - (4) Disarticulation knee.
  - (5) Amputation thumb.
  - (6) Amputation round about wrist.
  - (7) Disarticulation elbow
- (42) Critical levels
- (1) Leg 3 inches from the upper tibial articular surface.
  - (2) Thigh junction of upper and middle third.  
4 inches from the perineum.
  - (3) Forearm 5 inches from olecranon tip.
  - (4) Arm 4 inches from the axillary fold.
- (43) Mortality in amputations is in indirect proportion to the nearness of the amputation sites to the trunk.
-



**PART II**

**REGIONAL SURGERY**







- Viz (a) Supra-ciliary ridges  
(b) Temporal ridges  
(c) Superior occipital ridges
- Diff diag (1) Sub-pericranial hæmatoma  
(2) Safety valve hæmatoma  
(3) Cellulitis scalp  
(4) Hydro-cephalus
- Compl (1) Blood absorption toxæmia  
(2) Infection and its sequelæ  
(3) Intra-cranial  
(a) Primary traumatic  
(b) Secondary to infection
- Treat (1) Conservative application of cold pot. iod.  
(2) Operative Evacuation  
Ind (a) Tenderness and fever  
(b) Infection

(C) Sub-pericranial Cephal-hæmatoma :

- Etio (1) Difficult labour  
(2) Trauma
- Clinic (1) Fixed tender swelling  
(a) Hard raised margins  
(b) Central soft depression  
(2) Limitation to one bone
- Diff. diag (1) Depressed fracture  
(2) Subcutaneous hæmatoma  
(3) Cephal-hydrocele traumatic meningocele
- Compl (1) Delayed absorption  
(2) Infection suppuration and osteomyelitis  
(3) Ossification  
Diff diag Any tumour of the skull
- Treat Conservative

(2) WOUNDS OF THE SCALP

- Etio (1) Incised  
(2) Contused Blunt trauma  
(a) Simulate incised wound  
(b) Association with local depressed fracture  
(c) Always probe
- Compl (1) Hæmorrhage  
(2) Sepsis Suppuration or cellulitis or osteomyelitis  
(3) Associated fracture skull  
(4) Intra-cranial complications
- Treat (1) Shave the whole head  
(2) Debridement

- (3) Exploration treat underlying pathology
- (4) Loose stitches
- (5) Wet dressings

### (3) AVULSION OF THE SCALP

Etio Ladies in mill accidents

- Treat
- (1) Replacement and suture
  - (2) Cushing's method  
Tripod incision sutured &
  - (3) Thiersch's grafting

### (4) TRAUMATIC ANEURYSM OF THE SCALP

Site Temporal artery

- Clinic
- (a) History of local trauma with local contusion
  - ↓ (b) Pulsating swelling  
In the line of temporal artery

- Treat
- (1) Double ligature
  - (2) Excision

## (III) INFECTIONS OF THE SCALP:

### (A) LOCAL SEPSIS OF THE SCALP

- (1) BOILS (See under skin and subcut. tissues)
- (2) CARBUNCLES

Site Nape of the neck

Clinic (See under skin and subcut. tissues)

- Compl
- (1) Regional cranial and intra-cranial
  - (2) (See under skin and subcut. tissues)

Treat (See under skin and subcut. tissues)

### (3) INFECTED SEBACEOUS CYSTS OR DERMoids

- Clinic
- (1) Inflamed swelling with
    - (a) Sinus discharging purulent discharge
    - (b) Fungating ulceration  
"Cock's peculiar tumour"
  - (2) History of previous non-inflamed swelling

Diff. diag Epithelioma

Treat Excision After subsidence of acute phase

### (4) SEPTIC WOUNDS

- Clinic
- (a) Tenderness and tension under the wound
  - (b) Boggy round about
  - (c) General toxæmia

Treat Ample drainage by removal of sutures

### (B) REGIONAL SEPSIS OF THE SCALP

- (1) SEPTIC WOUNDS (See above)

## (2) SUB-PERICRANIAL SUPPURATION :

- Etio (a) Infected cephal hæmatoma  
 (b) Underlying osteomyelitis  
 (u) Septic wounds

Clinic Inflammatory swelling limited to one bone

Compl Cranial and intra-cranial

Treat Early incision and evacuation

## (C) GENERAL SEPSIS OF THE SCALP

## (1) ERYSIPELAS OF THE SCALP

(See under erysipelas)

- Clinic (a) Palpably raised red swelling of the skin  
 (b) Regional lymphadenitis  
 (c) General toxæmia

Special compl Cranial and intra-cranial

Treat (See under erysipelas)

## (2) CELLULITIS OF THE SCALP

- Etio Primary local focus  
 Boil or infected scratch

Clinic (a) Local extensive inflammatory cedematous swelling of the scalp  
 (b) General acute toxæmia

Special compl Cranial and intra-cranial

Treat (See under cellulitis)

## (3) SUB-EPICRANIAL SUPPURATION

- Etio Infected sub-epicranial hæmatoma  
 Path Bag of pus under galea aponeurotica

Clinic (a) Inflammatory fluctuating swelling  
 Limited by insertions of the galea  
 (b) Acute toxæmia

Diff diag Sub-epicranial hæmatoma

Special compl Cranial and intra-cranial

Treat Early incision and evacuation

## (IV) CYSTIC SWELLINGS OF THE SCALP:

## (1) DERMoids (See above)

## (2) SEBACEOUS CYSTS

- Clinic (a) Non localisation to midline or sutures  
 (b) Adhesion to skin at one point  
 (c) Multiple

Diff diag (a) Dermoid cysts  
 (b) Meningoceles  
 (c) Cold abscesses  
 (d) Encapsuled lipomata  
 (e) Cavernous angiomas

- | Treat | Excision |
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| 100   | 100      |

(See under central nervous system)

(See under central nervous system)

(See also under respective tumours)

### (1) ANGIOMA OF THE SCALP

(B) **Cavernous**

- (C) Plexiform Tortuous mass of pulsating vessels  
Site Temporal artery orbit

Diff. diag (a) Cystic swellings

- Compl (a) Baldness  
(b) Ulceration → hemorrhage

Put in continuous or blanket sutures all round the cut margins to check haemorrhage

- ## (2) FIBROMA OF THE SCALP

(B) Fibroma of the ualca sponenrotica

(a) Local

(D) Pure fibroma.

## (2) SUB-PERICRANIAL SUPPURATION

- Etio (a) Infected cephal hæmatoma  
       (b) Underlying osteomyelitis  
       (c) Septic wounds  
 Clinic Inflammatory swelling limited to one bone  
 Compl Cranial and intra-cranial  
 Treat Early incision and evacuation

## (C) GENERAL SEPSIS OF THE SCALP

## (1) ERYSIPELAS OF THE SCALP

(See under erysipelas)

- Clinic (a) Palpably raised red swelling of the skin  
       (b) Regional lymphadenitis  
       (c) General toxæmia  
 Special compl Cranial and intra-cranial  
 Treat (See under erysipelas)  
 (2) CELLULITIS OF THE SCALP  
 Etio Primary local focus  
       Boil or infected scratch  
 Clinic (a) Local extensive inflammatory oedematous swelling of the scalp  
       (b) General acute toxæmia  
 Special compl Cranial and intra-cranial  
 Treat (See under cellulitis)

## (3) SUB-EPICRANIAL SUPPURATION

- Etio Infected sub-epicranial hæmatoma  
 Path Bag of pus under galea aponeurotica  
 Clinic (a) Inflammatory fluctuating swelling limited by insertions of the galea  
       (b) Acute toxæmia  
 Diff diag Sub-epicranial hæmatoma  
 Special compl Cranial and intra-cranial  
 Treat Early incision and evacuation

## (IV) CYSTIC SWELLINGS OF THE SCALP:

## (1) DERMoids (See above)

## (2) SEBACEOUS CYSTS

- Clinic (a) Non localisation to midline or sutures  
       (b) Adhesion to skin at one point  
       (c) Multiple  
 Diff diag (a) Dermoid cysts  
       (b) Meningoceles  
       (c) Cold abscesses  
       (d) Encapsuled lipomata  
       (e) Cavernous angiomata

- |       |     |            |                        |
|-------|-----|------------|------------------------|
| Compl | (a) | Infection  |                        |
| -     | (b) | Ulceration | Cock a peculiar tumour |
|       | (c) | Malignancy |                        |
|       | (d) | Horns      |                        |

Treat Extension

### (3) MENINGOCELES

(See under central nervous system)

#### (4) HYDROCEPHALUS

(See under central nervous system)

## (V) NEW GROWTHS OF THE SCALP

(See also under respective tumours)

(A) Mesoblastic tumours

### (1) ANGIOMA OF THE SCALP

**Varieties** (A) Capillary Naevi, birth marks

(B) **Cavernous**

- (a) Sponge-like
- (b) Compressible
- (c) Pseudo-inflammatory

(C) **Plexiform** Tortuous mass of pulsating vessels

**Sites** Temporal artery, orbit

(D) Lymphangioma

Diff. diag (a) Cystic swellings

Dermoids, sebaceous cysts,  
meningococci, cold abscesses

- (b) Soft encapsulated growths

**Lipomas, fibromas**

(e) Local sub-acute inflammations

Comp1 (a) Baldness

- (b) Ulceration → haemorrhage

Treat	( $\alpha$ )	Exclusion
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Put in continuous or blanket sutures all round the cut margins to check hemorrhage.

- (b) **Ligature of tributaries**

- (c) Carbon-dioxide snow

- (d) **Deep X Ray therapy**

- ## Electrolysis

- Radium**

## (2) FIBROMA OF THE SCALP

**Varieties** (A) *Molluscum fibrosum*

- (B) Fibroma of the galea aponeurotica

- (C) Neuro-fibroma

- (a) Local

- (b) Plexiform

- (D) Pure fibroma



- Clinic (a) Local encapsuled  
 (a) Diff diag from cystic swellings  
 (β) Bone absorption  
 (b) Diffuse neuro-fibroma  
 Sites (a) Orbital region  
 (b) Temporal region  
 (c) Auricular region

### (3) LIPOMA OF THE SCALP

- Varieties (1) Local encapsuled  
 (a) False fluctuation  
 (b) Bone absorption  
 (2) Diffuse  
 Site Occipital region

Compl Underlying defect of the cranium  
 Meningocele

### (4) FIBRO-SARCOMA OF THE SCALP

- Path Diffuse epicranial or scar fibro-sarcoma  
 Clinic Multi lobulated and diffuse growth of the scalp  
 with baldness

### (5) CYLINDROMA OF THE SCALP

- Syn Turban tumour  
 Path ? Baso-cellular carcinoma  
 ? Endothelioma  
 Clinic Extensive turban-like nodular swelling  
 involving greater part of the scalp

## (B) Epiblastic tumours

### (1) PAPILLOMA

- Clinic Warts  
 Compl : (a) Irritation  
 (b) Sepsis  
 (c) Malignancy

### (2) SQUAMOUS CARCINOMA

- Etio (a) Papilloma  
 (b) Chronic ulcerated sebaceous cyst  
 (c) Chronic ulcer  
 Clinic (a) Ulcerative  
 (b) Warty  
 Diff. diag (a) Papilloma  
 (b) Ulcerated cysts or growths  
 Treat (1) Surgical radical excision with lymph glands  
 (2) Radium

**(C) Transitional or basal-celled tumour****(1) RODENT CARCINOMA**

- Path (a) Outermost layer of columnar epithelium  
 (b) No cell nests

Clinic (a) **Ulcerous Rodent ulcer**

Site Frontal temporal

- Clinic (i) **Slowly spreading painless relentless ulcer with slightly raised or beaded edges ultimately eroding the bone and exposing the intra-cranial contents**

(ii) **No enlargement of regional lymph glands**(b) **Tuberous nodular**

- Treat (1) **Radium 40-80 mgm. hours per square cm.**  
 (2) **Deep X Rays**

**(2) MELANOMA MALIGNUM**Def **Malignant growth containing melanin**

- Eti (a) **Primary**  
 (b) **Secondary to mole**

Path (1) **Melanotic carcinoma**Path **Epithelial**Metastases **Lymph glands**(2) **Melanotic sarcoma**Path **Mesothelial**Metastases **Lungs, brain, liver**

- Clinic (1) **Local Insignificant focus, hidden by hair**  
 (a) **Pigment patch**  
 (b) **Extending or ulcerating mole**

(2) **Secondaries**

- (a) **Enlarged regional lymph glands**  
 or (b) **Lung signs**  
**Liver enlargement**  
**Brain signs**

- Treat (1) **Preventive excision of pigment patches or moles**  
 (2) **Radium**  
 (3) **Deep X Rays**

**(B) THE SKULL****(1) CONGENITAL ABNORMALITIES:**

- (1) **LOCAL DEFECTS** Associated with meningocele  
 (2) **REGIONAL DEFECTS** Sinus pericranii

Def **Prolongation of anterior longitudinal venous sinus through ununited frontal suture**

## (4) Bone

(a) Detach the pericranium

(b) Inspection of fracture

(c) Treatment of fracture

(1) Leave alone fissured fracture

(2) Simple elevation depressed fracture

(3) Trephining and elevation

(4) Simple excision

(5) Trephining *en bloc*

Ind (1) Small depressed fracture

(2) Fracture over sinuses

(3) Pond and gutter fractures

(4) Punctured fracture

(5) Potential sepsis

## (A) Preservation of bone

Ind (a) Pieces not devoid of periosteum

(b) No potential compression

(c) No potential sepsis

(d) Defect extensive

## (B) Excision of bone

Ind (a) Pieces devitalised

(b) Potential compression

(c) Potential sepsis

(d) Defect limited

## (5) Dura Open only if

(a) Torn and lacerated

(b) Subdural compression

(c) Subdural sepsis

(6) Toilet evacuation of blood  
loose lacerated material  
foreign bodies  
septic material

## (7) Treatment of complications

Intra-cranial (a) Haemorrhage

(a) extradural

(β) subdural

(b) Laceration

(c) Compression

(d) Sepsis

## (8) Debridement

## (9) Closure with or without drainage

## (B) Basal general deformation fractures :

## (1) Observative

(a) Complete rest

(b) Observation of complications

(u) General nursing

- (d) Prophylactic sedative and antitensive treatment  
(See under cerebral irritation)
- (e) Urotropine M & B 693
- (2) Operative trephining
  - Ind (a) Compression  
Local or gradually spreading
  - (b) Septic complications  
Requiring drainage
  - (c) Sequelae  
Late organic

*After-treatment of fracture skull*

- (1) Observation for complications
- (2) Complete rest with sedatives
- (3) Prophylactic antitension treatment
- (4) Prolonged restful convalescence

(3) GUNSHOT WOUNDS OF THE SKULL

- Comp (A) Brain
- (B) Vessels
- (C) Skull
- (D) Septa
- (E) Retention of foreign bodies
- Treat Operate on every case within 24-36 hours
  - (a) Preliminary X-Ray
  - (b) Excision of the wound
  - (c) Exposure of the bone
  - (d) Treatment of fracture:
    - (a) Trephine and enlarge the opening
    - (b) Trephine en block
  - (e) Dura mater open if
    - (a) Laceration
    - or (b) Subdural compression
  - and (f) No septa outside dura
  - (f) Search for and removal of foreign body
    - (a) Remove if superficial or septic
    - (b) Leave alone if deep and sterile
  - (g) Toilet
  - (h) Closure

*Post-operative complications after trephining for skull trauma*

- (A) Immediate
  - (1) Continuance or appearance of intra-cranial complications
    - (a) Increased tension
      - (a) Irritation
      - (b) Compression
    - (b) Septa Meningitis  
Cerebritis  
Abscess

- (2) Extra-cranial Sepsis
- (3) Chest complications
- (B) Intermediate :
  - (1) Chronic or recurrent compression
    - Cause : Chronic cerebral oedema
    - Clinic : Cerebral irritation syndrome
  - (2) Chronic sepsis
    - (a) Intra-cranial Hernia cerebri
    - (b) Cranial Necrosis
- (C) Late
  - (1) Organic sequelae traumatic epilepsy
  - (2) Traumatic neuroses

*Special features of fracture skull in children.* (Med. Ann. 1940)

Etiology	Age 5-10 years
Clinical pts	(1) Relatively benign, though symptoms appear severe (2) Rapid and unexpected recovery (3) Absence of unpleasant sequelae (4) Great discrepancy between fracture and clinical signs (5) No slowing of the pulse in compression (6) Safety-valve haematoma

*Indications for operation*

- (1) Open fractures
- (2) Gross local neurological signs
- (3) Coma persisting for 36-48 hours } + rapid probe

### (III) INFECTION OF THE CRANIUM:

#### (1) ACUTE SUPPURATIVE PERICRANITIS

Etiology	(a) Infected scalp wound (b) Suppurating cephal haematoma
Clinic	(a) Acute inflammatory swelling ↓ (b) Suppuration ↓ (c) Ulceration exposing dead white bone
Complications	(a) Necrosis (b) Emissary vein thrombosis → sinus thrombosis (c) Intra-cranial sepsis
Treatment	Incision and drainage

#### (2) ACUTE OSTEOMYELITIS OF THE CRANIUM

Etiology	(a) Infected scalp wounds (b) Septic open fractures (c) Extension from local septic focus Sinusitis Mastoiditis Extra-dural abscess (d) Pyæmic
----------	--

- Path Inflammation of the diploe and outer table, inner table being comparatively healthy
- Clinic (a) Presence of or history of etiology  
(b) Local Signs of inflammation  
(c) General Signs of sepsis  
(d) Intra-cranial Signs of tension and sepsis
- Compl Intra-cranial sepsis  
(a) Sinus thrombo-phlebitis  
(b) Extra-dural abscess  
(c) Meningitis  
(d) Subdural abscess  
(e) Cerebritis and cerebral abscess
- Treat (1) Excision In toto of the affected bone  
(2) Adson operation (Med. Annual 1940)  
Wide removal of the outer table and the diploe only by nibbling through small burr holes upto but not through the inner table

### (3) CHRONIC OSTEOMYELITIS OF THE CRANIUM

#### (A) Septic

- Etio (a) Sequela of acute osteomyelitis  
(b) Sequela of extra-cranial infection  
(c) Sequela of intra-cranial infection
- Clinic Bare dead bone exposed in the base of a chronic septic ulcer
- Treat (1) Removal of sequestrum after separation  
(2) Excision of outer table and diploe  
In extra-cranial infections  
(3) Excision of the whole affected bone & drainage  
In intra-cranial infections

#### (B) Syphilis

- Path Diffuse gummatous osteo-periostitis
- Clinic (a) Marked bony overgrowth  
(b) Silent necrosis  
Very slow separation of avascular sequestra
- Treat (a) Anti-syphilitic treatment  
↓ (b) Excision  
or (c) Removal of sequestrum after separation

#### (C) Tuberculosis

- Path (a) Chronic periostitis } + cold abscesses on  
(b) Chronic osteomyelitis } either surfaces
- Clinic (a) Symptomless pulpy swelling  
↓ (b) Subcutaneous cold abscesses  
↓ (c) Sinuses : Leading to carious cranium
- Treat Excision of the affected bone

**(IV) CRANIAL TUMOURS:**

(See also under respective tumours)

**(1) INNOCENT CRANIAL TUMOURS**

- (A) Lipoma }  
 (B) Fibroma }

Path (a) Periosteal  
 (b) Sometimes encysted  
 (c) Absorption of underlying bone

Clinic Pseudo-cystic if encysted

Treat Excision

**(C) Ivory osteoma**

Sites (1) Vault  
 (a) Outer surface  
 (b) Inner surface  
 (2) Air sinuses  
 (3) External auditory meatus

Clinic (1) Swelling  
 (2) Pressure symptoms

**(2) MALIGNANT CRANIAL TUMOURS****(A) Primary Sarcoma**

- (a) Periosteal bun-shaped tumour  
 slow or rapid  
 pulsatile or bony  
 (b) Central myelo-sarcoma

**(B) Secondary:****(1) Sarcoma**

- Primaries (a) Juvenile kidney sarcoma  
 Multiple, round, soft nodules  
 (b) Bony sarcoma elsewhere  
 (c) Meningioma

**(2) Carcinoma**

- Primaries (1) Breast  
 (2) Bronchus  
 (3) Kidney  
 (4) Prostate  
 (5) Stomach  
 (6) Thyroid

Clinic (1) Localized pain in a bone

**(2) Swelling:**

- (a) Vascular  
 (a) Thyroid } secondaries  
 (b) Kidney }  
 (b) Bony

(3) X Ray Erosion without new bone formation

- Treat (1) Deep X Ray therapy  
(2) Radium

## (V) ACQUIRED DEFECTS OF THE CRANIUM:

### (1) CRANIOTABES

Localised thinning of the cranium due to a metabolic disease  
(a) Rickets  
(b) Osteomalacia  
(c) Syphilis

### (2) PRESSURE ABSORPTION Secondary to

- (a) Cysts or aneurysms  
(b) Benign growths

### (3) EROSION

- (A) Septic acute and chronic osteomyelitis  
(B) Malignant growths

### (4) OPERATIVE Trophine defects

Sequelæ (a) Tender scar  
(b) Intra-cranial consciousness  
(c) Headache  
(d) Epilepsy  
(e) Liability to trauma  
(f) Neuroses

- Treat (1) Celluloid graft  
(2) Bone-graft  
(3) Protective cap or helmet

## (VI) IMPORTANT POINTS

- (1) Motor car accidents are becoming the chief etiological factor in head injuries
- (2) Septic complications of head wounds or sepsis
  - (A) Extra-cranial
    - (a) Local abscess or sloughing
    - (b) Subcutaneous cellulitis
    - (c) Sub-epicranial abscess or cellulitis
    - (d) Sub-pericranial suppuration
  - (B) Cranial
    - (a) Acute osteomyelitis
    - (b) Chronic osteomyelitis with necrosis
  - (C) Intra-cranial
    - (a) Extra-dural abscess
    - (b) Sinus-phlebitis and thrombosis
    - (c) Meningitis
    - (d) Subdural abscess
    - (e) Brain abscess or cerebritis
    - (f) Hernia cerebri



- (3) The whole head should be shaved in every case of head injury
- (4) Fluctuating and pseudo-fluctuating swellings of the scalp
  - (A) Fluctuating
    - (a) Sebaceous cyst
    - (b) Dermoid cyst
    - (c) Meningocele congenital or traumatic
    - (d) Haematoma
    - (e) Abscess acute or cold
    - (f) Sinus pericrani
  - (B) Pseudo-fluctuating
    - (a) Lipoma encysted
    - (b) Fibroma encysted
    - (c) Angioma cavernous
- (5) Local swelling on the cranium
  - (1) Inflammatory
    - (A) Acute
      - (a) Acute pericranitis
      - (b) Acute osteomyelitis
    - (B) Chronic
      - chronic osteomyelitis
      - (a) Sepsis
      - (b) Syphilis
      - (r) T B
      - (t) Typhoid
  - (2) Pseudo-inflammatory vascular
    - (A) Traumatic cephal-haematoma
    - (B) Benign angioma
    - (C) Malignancy
      - (a) Sarcoma
      - (b) Secondary carcinoma
  - (3) Non inflammatory
    - (A) Traumatic old ossified cephal haematoma
    - (B) Benign growths
      - periosteal lipoma
      - fibroma
      - ivory osteoma
    - (C) Some secondary malignant growths
- (6) Complicating features of fracture skull
  - (1) Infection
  - (2) Pressure intra-cranial
  - (3) Associated injury to central nervous system
  - (4) Sequelae
    - (a) Non-organic or functional
    - (b) Organic
      - (a) pressure
      - (b) fibrosis
      - (r) loss of protection
- (7) Two types of cranial fractures call for immediate interference
  - (a) Depressed fractures
  - (b) Compound fractures

- (8) Three important factors in basal fractures
  - (a) Indirectly compound
  - (b) Cranial nerve injuries
  - (c) Observative treatment
- (9) Nerve palsies in cranial injuries may be
  - (a) Immediate laceration
  - (b) Intermediate hæmorrhage or oedema in the sheath
  - (c) Late fibrosis
- (10) Presence or absence of fracture skull is not important in respect of sequelæ and complications of head injuries
- (11) Anæsthesia is not necessarily a sign of fracture of anterior table but rather of injury to the under surface of frontal and olfactory tracts.
- (12) Fracture of the skull is certainly not the criterion of extent of cerebral damage sustained. In the absence of fracture, cerebral injury may be considerable.
- (13) Patients with fracture skull who survive, are returning to their full working capacity more quickly than patients with head injury of the same magnitude but without fracture.
- (14) Common clinical signs of post traumatic neuroses
  - (a) Headache
  - (b) Giddiness
  - (c) Mental instability
  - (d) Inability to concentrate
  - (e) Homicidal or suicidal tendencies
  - (f) Lack of emotional control
  - (g) Change of temperament
  - (h) Moral turpitude
- (15) General deformation fractures  
Observative treatment with interference only when indicated
- (16) Local deformation fractures open and depressed  
Early interference
- (17) Fracture skull and its intra-cranial complications are separate entities, each of which may have separate independent existence without the presence of the other their treatment may be compared with those of acute appendicitis and pelvic abscess.
- (18) Treatment of fracture base of the skull is maintenance of asepsis by masterly inactivity with no plugging or washings.
- (19) In children, local fracture of the vault may be simple and should be elevated if there is depression even though there are no symptoms.

- (20) In all operations on the cranium, try to keep the dura intact as far as and if possible.
  - (21) Type of acute osteomyelitis common in the long bones of the limb—a metaphysitis—is not found in the skull.
  - (22) Bones developed from membranes have poor regenerative power
  - (23) Localised persistent pain or a localised swelling on the skull in old age  
? Secondary malignancy
  - (24) Intra-cranial complications of fracture skull
    - (1) Immediate traumatic
      - (a) Concussion
      - (b) Acute hæmorrhagic compression
    - (2) Intermediate inflammatory
      - (a) Chronic or delayed compression
        - (α) Hæmorrhage
        - (β) Edema of brain
      - (b) Intra-cranial sepsis
    - (3) Late sequelæ
      - (a) Organic fibrosis
      - (b) Functional.
-

## CHAPTER II

# THE FACE

### (1) CONGENITAL ABNORMALITIES OF THE FACE :

**Embryology :** Stomodeum is surrounded by following processes

- (a) Fronto-mesial process
- (b) Mesio-nasal or globular processes
- (c) Lateral nasal processes
- (d) Maxillary extensions of mandibular
- (e) Mandibular processes

**Pathology** Failure of union or excessive union of the maxillary process with other processes is the most common cause of facial malformations.

**Path. varieties**

#### (A) ABNORMAL UNION BETWEEN PROCESSES

- (1) **Macrostoma** Failure of union between maxillary and mandibular
- (2) **Microstoma** Excessive fusion between maxillary and mandibular
- (3) **Hare-lip :**  
Failure of union between maxillary and globular (see under lip)
- (4) **Cleft palate** Failure of union between
  - (a) Maxillary and globular
  - + (b) Palatal processes of maxillary (see under palate)
- (5) **Facial cleft**  
Failure of union between maxillary and lateral nasal + globular
- (6) **Mandibular cleft**  
Failure of union between mandibular processes

#### (B) INCLUSION ALONG THE FUSION LINES

- (1) **Dermoid cyst**
  - (a) Outer angle of the orbit
  - (b) Root of the nose
- (2) **Meningocele** Root of the nose

#### (C) BRANCHIAL CLEFT ANOMALY

- (1) Pre-auricular fistula
  - (2) Pre-auricular dermoid
  - (3) Auricular appendages
- } Anomalies of the posterior end of first branchial cleft

- (20) In all operations on the cranium, try to keep the dura intact as far as and if possible.
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## (D) CONGENITAL NEW GROWTHS

: Naevi and moles

## (E) MISCELLANEOUS

(1) Anophthalmia

(2) Nasal atresia

(3) Fistula of the lip (see under lip)

Etiol (1) Heredity: 50%

(2) Race Negroes rare

Hebrews less

Whites common

Clinic Facial cleft Upper lip

↓ Middle of lower eyelid

↓ Outer canthus

↓ Temporal region

## (II) TRAUMA OF THE FACE:

## (1) CONTUSIONS OF THE FACE

(A) Orbital contusion Black eye (see under Orbit)

(B) Nasal contusion

Diff. diag From nasal fracture

(C) Mandibular contusion

(1) Subcutaneous movable over the bone

(2) Subperiosteal (a) non mobile

(b) very painful

Diff. diag From fracture jaw

Compl (a) Sepsis osteomyelitis jaw

(b) Fibrous → ossification

(c) Associated fracture

Treat Cold applications

## (2) PENETRATING WOUNDS OF THE FACE

Etiol Stabs

Glass wounds

Compl (1) Sepsis with cellulitis or suppuration

(2) Scars

(3) Injury to (a) Salivary duct

(b) Facial nerve

(c) Nose and lip

Treat Principles

(a) Local analgesia novocain + adrenalin

(b) Eyeless needles for sutures

(c) Subdermal horse-hair sutures

(d) Careful eversion of skin margins

(e) Immediate plastic repair of lost tissues

(f) Attention to Stenson duct and facial nerve

## (g) Attention to fracture deformities

- (a) Nasal
- (b) Malar
- (r) Zygomatic
- (s) Mandibular

## (h) Early removal of sutures fifth day

## (3) FRACTURES OF THE FACIAL BONES

(See under bones)

- Sites
- (a) Nose
  - (b) Orbit
  - (c) Maxilla
  - (d) Malar
  - (e) Zygomatic arch
  - (f) Mandible

- Sp. compl
- (1) Deformity
  - (2) Emphysema fracture air sinuses
  - (3) Sepsis

## (4) DISLOCATION OF THE JAW (See under joints)

## (III) ACUTE INFECTIONS OF THE FACE:

## (1) BOILS (See under skin)

- Special compl
- (a) Facial cellulitis
  - (b) Regional lymphadenitis
  - (c) Cavernous sinus thrombosis
  - (d) Septicæmia or pyæmia

- Treat
- (A) Local treatment
    - (a) Warm compresses
    - (b) Mag. sulph-glycerine after bursting
    - (c) No operative interference
  - (B) Specific treatment
    - (a) Sulphanilamide
    - (b) Tin and manganese
    - (c) Vaccines
  - (C) Special treatment
    - Prophylactic ligature of angular vein

## (2) CARBUNCLE (See under lip)

## (3) ERYSIPELAS (See under skin)

- Special compl
- (1) Cavernous sinus thrombosis
  - (2) Recurrence → lymphatic œdema

## (4) CELLULITIS (See under skin)

Etiology Local septic focus

Clinic Œdematous, brawny spreading swelling

- Compl
- (a) Cavernous sinus thrombosis
  - (b) Cervical cellulitis → œdema glottis
  - (c) Sloughing



- Treat (1) General and specific  
 (2) Incisions parallel to the nerve branches  
 ↓ Mag. sulph-glycerine packs  
 (3) Prophylactic angular vein ligature  
 Ind (a) Unilateral oedema of inner canthus  
 + (b) High temperature  
 Tech (1) Proper (a) Hypnotic 20 minutes before  
 (b) Castor oil into the eye  
 (2) Anaesth Novocain infiltration  
 (3) Steps (a) Incision over the line of the vein  
 (b) Muscle tissue split  
 (c) Divide angular vein between ligatures  
 (d) Skin sutures  
 (e) Collodion dressings

#### 5) ANTHRAX (See under anthrax)

- Clinic (1) Local Pimple  
 ↓ Papule  
 ↓ Pustule  
 ↓ Black slough  
 (2) Regional: Acute inflammatory oedema  
 (3) General Toxaemia or septicæmia  
 (4) Occupation: Contact with animal carcass,  
 shaving brush  
 Compl (a) Cavernous sinus thrombosis  
 (b) Cervical cellulitis with oedema glottis  
 (c) Anthrax septicæmia  
 Treat (1) Sclavo's serum  
 (2) Sulphanilamide group  
 (3) Excision

### (IV) ULCERS OF THE FACE:

- (1) NON SPECIFIC  
 (a) Trauma  
 (b) Burns and scalds  
 (c) Irritant dermatitis and excoriations  
 (d) Ulcerating sebaceous cyst  
 (e) Inflamed molluscum contagiosum  
 (a) Multiple umbilicated projections  
 (b) Rapid appearance in crops  
 (2) SPECIFIC  
 (A) T B.  
 (a) Scrofulo-dermis: (See under skin)  
 (b) Lupus (See under skin)  
 (B) Syphilis  
 (a) Extra-genital chancre Lip, eyelid  
 (a) Swelling with erosion  
 or (b) Ulcerative  
 + (c) Massive enlargement of lymph glands

## (b) Tertiary

(a) Gummatous

(β) Lupoid

## (C) Actinomycosis

## (D) Tropical sore

## (E) Leprosy

## (3) NEO PLASTIC

## (A) Rodent (See under skin)

Diff. diag	Signs	Rodent	Lupus
	Extension	Superficial + deep	Superficial only
	Base	No epithelisation	Epithelisation
	Margins	Beaded	Non indurated
	Glands	Not enlarged	Enlarged

## (B) Epitheliomatous

(a) Flat

(β) Fissured

(γ) Excavated

(δ) Polypoid

## (C) Melanoma

## (D) Sarcoma

## (V) NEOPLASMS OF THE FACE:

(See also under respective tumours)

(1) HÆMANGIOMA *Nævi*

Varieties	(a)	Capillary	anywhere
	(b)	Compact	} cheek, forehead
	(c)	Cavernous	
	(d)	Plexiform	orbital temporal
Treat	(1)	Carbon-dioxide snow	
	(2)	Radium	
	(3)	Electro-cautery	
	(4)	Excision with plastic surgery	

## (2) MELANOMA

Clinic Pigmented or hairy moles

Compl (a) Disfigurement

(b) Malignant degeneration

Treat Excision with plastic surgery

## (3) NEURO FIBROMA

Varieties (a) Molluscum fibrosum anywhere

(b) Plexiform neuro-fibroma orbit ex

**(4) CARCINOMA OF THE FACE****(A) Squamous celled**

**Etio** Pre-existing focus of chronic irritation

(a) Lupus

(b) Rodent ulcer

(c) Paraffin products shale oil  
mule spinners

**(B) Secondary** Involvement in deeper carcinoma from  
jaws parotid mouth cheek

**(5) BASAL CELLED OR RODENT ULCER**

**Compl** (1) Secondary hæmorrhage

(2) Sepsis

(3) Hideous deformities

(4) Epitheliomatous change

(5) Aspiration pneumonia

**(VI) PARALYSIS OF THE FACE: (See facial nerve)**

**Etio** (1) Bell's palsy

(2) Head injuries or apoplexy

(3) Ear affections

(a) Otitis media

(b) Mastoid operation

(4) Parotid affections

(a) Carcinoma parotid

(b) Parotid incisions

**Clinic** Asymmetry of the face

**Treat** (1) Conservative

(2) Operative

**(A) Duel ballance** Nerve inlay

**Tech** Introduction of fresh or degenerated  
nerve graft into the gap made by  
removal of a piece of facial nerve  
in the aqueduct

**Ind** Good galvanic response

**(B) Gillies** Fascia lata operation

Subcutaneous insertion of fascia lata to  
aling up the paralysed muscles

**(B) THE ORBIT****(I) CONGENITAL ABNORMALITIES:**

(1) Apophthalmos

(ii) Misplaced eyes anencephalic monsters

**(II) TRAUMA TO THE ORBIT:**

(1) SUBCUTANEOUS CONTUSION: Black eye

**Etio** Direct blow

- Clinic (a) Contusion not restricted by orbital margin  
 (b) Sub-conjunctival hæmorrhage absent or shows posterior margin  
 (c) Lids more affected than conjunctivæ  
 (d) No proptosis  
 (e) Skin abrasions
- Diff. diag From orbital hæmatoma
- Treat Cold applications

## (2) FRACTURE ORBIT . Orbital hæmatoma

- Etio (1) Fracture base of the skull  
 (2) Direct fracture orbit
- Clinic (a) Contusion limited by orbital margin  
 (b) Sub-conjunctival hæmorrhage marked and does not show posterior limits  
 (c) Lids not affected or less affected  
 (d) Proptosis  
 (e) Skin not affected

## (3) PENETRATING INJURIES OF THE ORBIT

- Compl (1) Trauma to the eye ball  
 ↓ Sympathetic ophthalmia  
 (2) Panophthalmitis  
 (3) Orbital cellulitis → cavernous thrombosis  
 (4) Fracture orbit

## (III) INFECTIONS OF THE ORBIT :

### (1) STYE

- Def Acute inflammation of the hair follicle and gland
- Path Staphylococcal infection
- Clinic Puffy localised swelling of the eyelid  
 ↓ Yellow local spot
- Treat (1) Fomentations  
 (2) As in boil (see under skin)

### (2) ORBITAL CELLULITIS

- Etio (1) Penetrating septic injuries  
 (2) Secondary to  
 (a) External infections face  
 (b) Internal infections intra-cranial
- Clinic (1) Local acute inflammation  
 (a) Proptosis  
 (b) Chemosis  
 (c) Oedema of the eyelids  
 (2) General constitutional signs
- Compl (1) Cavernous sinus thrombosis  
 (2) Panophthalmitis
- Treat Incision and drainage  
 Along lower orbital margin

**(4) CARCINOMA OF THE FACE****(A) Squamous celled**

**Etio** Pre-existing focus of chronic irritation

(a) Lupus

(b) Rodent ulcer

(c) Paraffin products shale oil  
mule spinners

**(B) Secondary** Involvement in deeper carcinomas from  
jaws parotid mouth cheek

**(5) BASAL CELLED OR RODENT ULCER**

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(2) Sepsis  
(3) Hideous deformities  
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(5) Aspiration pneumonia

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(2) Head injuries or apoplexy  
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(a) Otitis media  
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(1) Anophthalmos

(2) Misplaced eyes anencephalic monsters

**(II) TRAUMA TO THE ORBIT:**

(1) SUBCUTANEOUS CONTUSION **Black eye**

**Etio** Direct blow

## (4) MEDIAN NASAL ROOT CYSTS

- (A) Dermoid
- (B) Meningocele
  - (a) Impulse
  - (b) Empties on pressure
- (C) Sinus Pericranii
  - (a) Vertical midline
  - (b) Impulse
  - (c) Visible than palpable
  - (d) Palpable linear bony defect
- (D) Sebaceous cyst
- (E) Mucocoele of frontal sinus

## (VI) EXOPHTHALMOS:

## (A) BILATERAL

- (1) Toxic goitre
  - (a) Exophthalmos
  - (b) Goitre
  - (c) Nerve signs tremors
  - (d) Heart signs : tachycardia
  - (e) Metabolism increased
- (2) Cavernous sinus thrombosis
  - (a) Septic focus on the face
  - (b) Acute general sepsis
  - (c) Acute local signs
    - (a) Acute oedema of the orbit
    - (b) Chemosis
    - (r) Proptosis
    - (s) Ophthalmoplegia
  - (d) Sequence unilateral → bilateral

## (B) UNILATERAL

- (1) Orbital hæmatoma
- (2) Orbital cellulitis
- (3) Orbital periostitis T B. and syphilis
- (4) Gumma
- (5) Tumours of the orbit Osteoma sarcoma  
xanthomatosis
- (6) Tumours of the eyeball (a) Glioma in children  
(b) Melanoma in adults
- (7) Aneurysms
  - (A) Arterio-venous aneurysm :
    - Etio : Fracture skull base
    - Path Int. carotid art. with cavernous sinus
    - Clinic (a) Pulsating exophthalmos
    - (b) Audible and subjective bruit
    - (c) Effect of proximal pressure
  - (B) Aneurysm of ophthalmic artery

## (3) ORBITAL PERIOSTITIS OR OSTEOMYELITIS.

(A) Septic

(B) Tuberculosis Cold abscesses

(C) Syphilitic Gumma therapeutic test  
Kahn reaction

## (IV) TUMOURS OF THE ORBIT:

(See also under respective tumours)

## Varieties

(1) Osteoma Ivory

(2) Carcinoma Lacrymal

(3) Glioma of the eye

Etiol Child about 4 years

Path Highly malignant

Clinic Bilateral

Rapid growth

Blindness

Compl Ulceration → fungation → hæmorrhage

(4) Melanoma Uveal

Etiol Adult 40-60 years

Path Malignant

Secondaries in liver

*Clinical features of orbital growths*

- (A) Local (1) Proptosis
- 
- (2) Keratitis
- 
- (3) Chemosis
- 
- (4) Œdema of the lids
- 
- (5) Visual disturbances

(B) Metastases Liver (in uveal melanoma)

## (V) CYSTS ROUND ABOUT THE ORBIT:

## (1) EXTERNAL ANGULAR DERMOID

Clinic Cystic swelling at the supero-ext. angle of the orbit

Treat Excision

## (2) MEIBOMIAN CYST

Def Staphylococcal infection of Meibomian gland

Clinic Local swelling in the lid visible or palpable  
through skin

Treat (a) Fomentations

↓ (b) Incision on the conjunctival aspect

↓ (c) Scraping if necessary

## (3) LACHRYMAL MUCOCELE

Path Obstruction with infection of lachrymal sac.

Treat Lachrymal douches → Excision

- (4) Treatment of protruding premaxilla
  - (a) Rely on muscular pressure of repaired lip
  - or (b) Rectification after fracture
- (5) Paring the cleft margins
  - (a) Careful measurements
  - (b) Free excision of median lip element
  - (c) Preservation of lateral lip element
  - (d) Preservation of all available skin
- (6) Reconstruction of nasal floor
 

**Veau**

  - (a) Separate deep surface of prelabrum
  - (b) Vomerine flap
  - (c) Flap from the nasal side of maxillary palatal process
  - (d) Skin flap from inner lining of nostril
- (7) Suture
  - (a) Independent closure of oral sphincter
 

By muco-muscular mattress sutures  
Chromic catgut 000.
  - (b) Skin sutures fine silkworm gut
  - (c) First suture at skin-vermillion border with careful alignment
  - (d) Leave slight projection at the site of junction of the lip elements
  - (e) Get vertical scar parallel to columella

After treat : (1) Rubber tubes in nostrils In infants

(2) Collodion dressings

+ (3) Elastoplast strip

or (4) Logan's bow

(5) Sutures out by 5th day

(6) Mouth gargles

(7) Avoid tension on sutures

Post. compl (1) Sudden asphyxia

(2) Broncho-pneumonia

(3) Sloughing of soft tissues

(4) Injury to incisor tooth bud

Sequelæ (5) Flat upper lip if premaxilla is removed

(6) Notching of the lip

(7) Spreading of the lip

(8) Flat nose



**(C) THE LIP****(1) CONGENITAL AFFECTIONS OF THE LIP:****(1) HARE LIP**

<b>Etio</b>	(a) Heredity (b) Boys (c) Left side
<b>Path</b>	
<b>Varieties</b>	(A) <b>Median</b> Rare (a) Cleft between two globular processes (b) Absence of premaxilla (B) <b>Unilateral</b> Failure of union between (a) Globular process and (b) Maxillary process (C) <b>Bilateral</b> [as in (B) on both sides]
<b>Degrees</b>	(1) Fistula of the lip rare (2) Notched lip incomplete (3) Complete hare-lip (4) Hare lip + nasal extension + premax. notch (5) Hare-lip + varying degrees of cleft palate
<b>Types</b>	(1) Pre-alveolar simple lip only (2) Alveolar total lip + alveolus
<b>Clinic</b>	(1) Deformity (a) Lip cleft (b) Premaxilla forward inclination (c) Nose flat (2) Inability to suckle
<b>Compl</b>	(1) Cleft palate (2) Other congenital deformities
<b>Treat</b>	Operative repair Cheilo-plasty (A) Pre-operative apposition by adhesive strapping (B) Time (1) Six weeks to twelve weeks (2) After healing if associated cleft palate is operated upon early + (3) Very good general health (C) Operative principles (1) Skilled anaesthesia (2) Methylene blue tattoo of guide points (3) Free liberation of soft tissues off the bones (a) Ala of the nose (b) Upto infra-orbital foramen

## (2) CRACKS OF THE LIP

- Eti (a) Cold weather  
 (b) Syphilis  
     (1) Congenital  
     (2) Primary chancre  
     (3) Secondary fissures angle of the mouth  
     (4) Tertiary gummatous

Clinic Painful raw breaches in surface

- Treat (1) Emollients hazeline snow  
 (2) Strapping  
 (3) Excision  
 (4) Treatment of etiology

## (3) BOIL AND CARBUNCLE OF THE LIP

(See under skin)

Path Staphylococcal infective inflammatory alonging of the subcutaneous and submucous tissues of the lip

Clinic Acute inflammatory oedema with multiple yellow points or openings

- Compl (1) Facial cellulitis  
 (2) Regional lymphadenitis  
 (3) Cavernous thrombo-phlebitis  
 (4) Septicæmia or pyæmia  
 (5) Cancrum oris

- Treat (1) Conservative  
     Fomentations  
     ↓ Mag sulph. glycerine pack  
     + Mouth gargles  
 (2) General and specific  
 (3) Special  
     (a) Prophylactic ligature of angular vein  
     (b) Local operative interference contra-indicated

## (4) SYPHILIS OF THE LIP

## (A) Primary chancre

Eti Most common extra genital

- Clinic (a) Indurative induration  
 (b) Hypertrophic warty  
 (c) Erosive fissure  
 (d) Ulcerative ulcer  
 (1) Painless indolent focus with indurative oedema  
 (2) Indolent massive enlargement of submaxillary or submental lymph glands

- (B) Secondary (a) Mucous patches  
 (b) Fissures angles of the mouth  
 (c) Ulcers

*Individual operations with indications***(A) Unilateral**

- (1) **Nelaton** Slight notch
- (2) **Rose** Symmetrical sides of the cleft
- (3) **Thompson** Symmetrical sides of the cleft
- (4) **Mirault** Unsymmetrical sides of the cleft
- (5) **Edward Owen** :  
Unsymmetrical large, deep cleft
- (6) **Veau** Implication of nasal floor

**(B) Bilateral**

- (1) **Rose** Symmetrical sides of the cleft
- (2) **Thompson** Symmetrical sides of the cleft
- (3) **Hagedorn** Unsymmetrical wide cleft
- (4) **Veau** Two stage operation at the interval of three months

**(C) Accessory operations**

- (1) **Nelaton's diamond operation** :  
Ind Post-operative notch
- (2) **Gillies cupid bow operation**  
Ind Irregular vermillion border
- (3) **Nasal plastic repair**  
Ind Nasal deformities
- (4) **Gillies epithelial inlay**  
Ind Flat lip

**(2) FISTULA OF THE LIP**

**Etio** Rare

**Path** Reversion to mucous glands of the shark

**Clinic** Two blind mucous pits  
Symmetrical on either side of midline  
Opposite lateral incisors

**Compl** Association with bilateral cleft lip

**(II) TRAUMA OF THE LIPS:**

- (1) **Bites**
- (2) **Lacerations**
- (3) **Amputations**

**Points** (1) Control hæmorrhage by finger compression on each side of the wound

- (2) Secure coronary artery on both sides
- (3) Pass stitch at the junc. of red margin and skin
- (4) Catgut sutures for mucous membrane
- (5) Silkworm or horsehair sutures for skin

**(III) INFLAMMATIONS OF THE LIPS:**

- (1) **TRAUMATIC**



- (C) Tertiary (a) Gummatous infiltration  
 (b) Gummatous nodule  
 (c) Gummatous ulcer

(D) Congenital Cracks at the angle of the mouth

#### (IV) GROWTHS ON THE LIP

(See also under respective tumours)

##### (A) MUCOUS CYSTS

Path Retention cyst of mucous gland  
 Clinic Bluish, shiny thin-walled, small  
 Treat Excision

##### (B) CONNECTIVE TISSUE GROWTHS

- (1) Haemangioma  
 (2) Lymphangioma Cavernous  
 Lymphangiomatous macrocheilia  
 (3) Neuro-fibroma Plexiform  
 Neuro-fibromatous macrocheilia

##### (C) EPITHELIAL TUMOURS

- (1) Papilloma Etiology of carapoma  
 (2) Carcinoma: Countryman's lip

Etio (a) Lower lip of old males  
 (b) Precancerous states

- (1) Chronic burns smoker's patch  
 (2) Keratoses  
 (3) Leucoplakia  
 (4) Chronic fissures and ulcers  
 (5) Papillomata

Path (1) Squamous celled carcinoma  
 (2) Spread

- (a) Local (a) mucous surface  
 (β) lip and face muscles  
 (b) Regional cheek, gums, alveolus  
 (c) Distant lymph glands  
 (1) Submental  
 (2) Submaxillary  
 (3) Upper deep cervical  
 (4) Lower cervical

Clinic (1) Local (a) Indurative  
 (b) Papillary or warty  
 (c) Fissure  
 (d) Ulcerative  
 With (a) Deep induration  
 (b) Infiltration of surroundings  
 (c) Eversion of margins  
 (d) Friability  
 (e) Rapid growth  
 (2) Enlarged lymph glands

Diff. diag Any other Chronic inflammation } of the lip  
 Chronic ulceration }  
 New growth }

Treat (1) Radium

(A) Primary Interstitial irradiation

Needles at intervals of 1 to 1.5 cms. fixed to the deep aspect of dental wax cover with a shield of 1 mm. lead, worn

(a) Continuously for 8-10 days

or (b) 12 hours a day for 3 weeks

(B) Glands Columbia paste collar

(2) Excision

Methods (1) Surgical  
 (2) Electro-thermal

Anaesth (1) General  
 (2) Local

Intra-oral procaine infiltration of

(a) Inf. dental foramen

(b) Infra-orbital foramen

Tech

(A) Primary with a margin of healthy tissues

(B) Glands

Contraind

(a) Early non-palpable glands

(b) Late stage

(1) Fungating

(2) Wide infiltration

(3) Below the level of thyroid cartilage

(4) Above the level of the angle of the jaw

Tech (a) Two stage } glands first  
 (b) One stage }

After treat Radium collar

One month after healing

## IMPORTANT POINTS

Heredity plays an important part in the production of congenital malformations of the face and the mouth.

Four most common congenital irregularities of the face are

(a) Hare-lip

(b) Cleft palate

(c) Orbital dermoid

(d) Congenital angioma or melanoma.

In trauma to the face, make sure about the absence of

(a) Fracture underlying a contusion

(b) Trauma to facial nerve

(c) Trauma to Stenson's duct.

- (C) **Tertiary** (a) Gummatous infiltration  
 (b) Gummatous nodule  
 (c) Gummatous ulcer

(D) **Congenital** Cracks at the angle of the mouth

#### (IV) GROWTHS ON THE LIP:

(See also under respective tumours)

##### (A) MUCOUS CYSTS

Path . Retention cyst of mucous gland  
 Clinic Bluish, shiny thin-walled, small  
 Treat Excision

##### (B) CONNECTIVE TISSUE GROWTHS

- (1) **Hæmangioma**
- (2) **Lymphangioma** Cavernous  
 Lymphangiomatous macrocheilia
- (3) **Neuro-fibroma** Plexiform  
 Neuro-fibromatous macrocheilia

##### (C) EPITHELIAL TUMOURS

- (1) **Papilloma** Etiology of carcinoma
- (2) **Carcinoma**: Countryman's lip

Etio (a) Lower lip of old males  
 (b) Precancerous states  
     (1) Chronic burns smoker's patch  
     (2) Keratoses  
     (3) Leucoplakia  
     (4) Chronic fissures and ulcers  
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 (2) Spread  
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               (β) lip and face muscles  
     (b) Regional cheek, gums alveolus  
     (c) Distant lymph glands  
         (1) Submental  
         (2) Submaxillary  
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         (4) Lower cervical

Clinic (1) Local (a) Indurative  
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               (c) Fissure  
               (d) Ulcerative  
               With (a) Deep induration  
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                   (c) Eversion of margins  
                   (d) Friability  
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Tech (a) Two stage } glands first  
 (b) One stage }

After-treat Radium collar

One month after healing

## IMPORTANT POINTS

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- (C) Tertiary (a) Gummatous infiltration  
 (b) Gummatous nodule  
 (c) Gummatous ulcer

(D) Congenital : Cracks at the angle of the mouth

## 7) GROWTHS ON THE LIP:

(See also under respective tumours)

### (A) MUCOUS CYSTS

Path Retention cyst of mucous gland  
 Clinic Bluish, shiny thin-walled, small  
 Treat Excision

### (B) CONNECTIVE TISSUE GROWTHS

- (1) Hæmangioma  
 (2) Lymphangioma Cavernous  
     Lymphangiomatous macrocheilia  
 (3) Neuro-fibroma Plexiform  
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### (C) EPITHELIAL TUMOURS

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 (2) Carcinoma Countryman's lip

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 (b) Precancerous states  
     (1) Chronic burns : smoker's patch  
     (2) Keratoses  
     (3) Leucoplakia  
     (4) Chronic fissures and ulcers  
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 (2) Spread  
     (a) Local (a) mucous surface  
               (b) lip and face muscles  
     (b) Regional cheek, gums, alveolus  
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         (4) Lower cervical

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         With (a) Deep induration  
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               (c) Eversion of margins  
               (d) Friability  
               (e) Rapid growth  
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    Chronic ulceration    } of the lip  
    New growth                }

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(3) Below the level of thyroid cartilage

(4) Above the level of the angle of the jaw

Tech (a) Two stage } glands first  
 (b) One stage }

After treat Radium collar

One month after healing

## IMPORTANT POINTS

- (1) Heredity plays an important part in the production of congenital malformations of the face and the mouth.
- (2) Four most common congenital irregularities of the face are
  - (a) Hare-lip
  - (b) Cleft palate
  - (c) Orbital dermoid
  - (d) Congenital angioma or melanoma.
- (3) In trauma to the face, make sure about the absence of
  - (a) Fracture underlying a contusion
  - (b) Trauma to facial nerve
  - (c) Trauma to Stenson's duct.

- (4) The dangerous area of the face  
Triangle from the angles of the mouth to the root of the nose.
- (5) The dangerous primary foci of the face
  - (a) Furuncles
  - (b) Carbuncles
  - (c) Pimples.
- (6) The most dangerous sequela of face sepsis  
*Cavernous sinus thrombosis.*
- (7) In every septic lesion of the face  
Lay persons must learn to keep their hands off their faces and surgeons must learn to keep their hands off their patients faces.
- (8) Angular and facial veins communicate with cavernous sinus via
  - (a) Directly (α) Naso-frontal vein  
↓ (γ) Superior ophthalmic vein
  - (b) Indirectly (α) Deep facial vein  
↓ (β) Pterygoid plexus.
- (9) Special ulcers of the face are
  - (a) Lupus never erodes bones
  - (b) Rodent goes deep.
- (10) A cystic tumour situated at the supero-external angle of the orbit is a dermoid unless proved otherwise.
- (11) Complications of a scar of the eyelid
  - (a) Ectropion
  - (b) Entropion
- (12) Repair of even the simplest looking hare-lip is a major operation in a baby less than six months old.
- (13) Real test of a successful operation for hare-lip is not the perfection of the scar but the symmetry of the face.
- (14) Most important points in hare-lip surgery are
  - (1) Free liberation of soft tissues
  - (2) Independent closure of oral sphincter
  - (3) Careful alignment of vermillion border
  - (4) Slight projection at the junction
- (15) Union of the lip-cleft is sufficient in the majority of cases to induce a falling in of the alveolar projection and an approximation of the alveolar cleft.
- (16) Avoid interference with the premaxilla the bony parts remodel themselves if soft tissues are accurately apposed.
- (17) In bilateral pre-alveolar lip-clefts, prolabial skin should not be incorporated in the whole length of the lip.

- (18) Beware of sudden asphyxia in an infant operated upon for hare-lip repair rubber airways with constant watch are essential.
  - (19) Surgery for early and too late cancer of the lip should be replaced by radiotherapy
  - (20) Consensus of opinion is in favour of radiotherapy for early cancer of the lip and of avoidance of mutilating operations. Dissection of glands should only be undertaken, if they are palpable, enlarged and mobile.
  - (21) Recurrence after efficient treatment of cancer lip is unlikely after one year
  - (22) Any indolent focus on the lip  
? Chancra.
  - (23) Beware of a man with a glass eye and an enlarged liver  
? Uveal melanoma.
  - (24) Carcinoma of the angle of the mouth is very malignant.
-

## CHAPTER III

# THE EAR

### (1) EXTERNAL AUDITORY MEATUS:

#### (1) EXOSTOSES (Ivory type)

(A) Single, pedunculated  
Excision

(B) Multiple, sessile  
Leave alone

#### (2) FOREIGN BODIES

Clinic (1) History or no history  
(2) Painful and swollen ear  
(3) Discharge  
(4) Inspection

Treat (A) Soft body that can swell  
: Remove immediately  
(B) Hard body with no acute symptoms  
Remove at leisure  
(C) Living insects  
Instil few drops of 5% cocaine

Tech (1) Forceps useless and dangerous  
(2) Syringing

Ind (a) Loose small body  
(b) Soft breakable body

Contraind (a) Impacted hard body  
(b) Swellable body

(3) Tube with suction apparatus  
(4) Right-angled hook or curette  
(5) Open operation  
(a) Incision in post-aural furrow  
(b) Detachment of soft from bony meatus  
(c) Extraction of foreign body  
(d) Suture

### (3) FURUNCLE OF THE MEATUS

Def Inflammation of pilo-sebaceous gland of the cartilaginous meatus

Etiol (a) General lowered resistance  
(b) Eczema of the meatus  
(c) Septic discharge from the ear

- Clinic** (1) **Unripe boil:**  
Acutely painful and tender cedematous swelling of the mentus
- (2) **Mental abscess**
- (3) **Post-auricular abscess**  
Tenderness of pre-auricular or mastoid lymph gland
- Diff. diag** (1) **Otitis media**
- (2) **Mastoiditis**
- Treat** (1) **Stage of swelling and induration**
- (A) **Local**
- (a) Vaseline gauze pack
- (b) Glycerine ichthyol pack
- (c) Protection and heat to the ear
- (B) **General**
- (a) Colloidal manganese + stannoxyl
- (b) Aspirin + phenacetin + codein
- (C) **Don'ts**
- (a) Do not incise
- (b) Do not syringe
- (c) Do not use strong antiseptics
- (2) **Stage of mental abscess**  
Mental incision and drainage
- (3) **Stage of post-aural abscess**  
Post-aural incision and drainage

## (II) MIDDLE EAR:

### (1) ACUTE SUPPURATIVE OTITIS MEDIA

- Etio** (1) **Septic tonsils, adenoids or pharynx**
- (2) **Exanthemata**
- (3) **Acute fevers**
- Path** **Routes of infection**
- (a) **Eustachian tube**
- (b) **External auditory meatus**
- (c) **Internal auditory meatus**
- (d) **Blood stream**
- Clinic** (1) **Acute otalgia**
- (2) **Deafness**
- (3) **Pyrexia** High and variable
- (4) **Red bulging drum**
- Diff diag** (1) **Myringitis**
- (2) **Otitis externa**
- (3) **Herpes oticus**
- Treat** (1) **Conservative**
- Ind** (a) **Subsiding attack**
- (b) **No bulging of the drum**

(c) Adequate perforation

(d) No marked toxæmia

**(2) Myringotomy**

Ind (a) Bulging drum

+ (b) Acute toxæmia

Tech (a) General anæsthesia

(b) Incise from below upwards

After treat (a) Dry dressings

(b) No syringing or hydrogen peroxide

(c) No tonsillectomy within 3 weeks

**(2) CHRONIC SUPPURATIVE OTITIS MEDIA**

Eti (1) Acute otitis media with imperfect drainage

(2) Primary chronic otitis pharyngeal infection

Path Osteitis of middle ear

Granulations

Chronic suppuration

Cholesteatoma

Clinic (1) Chronic discharge through perforated tympanum

(2) Perforation, granulations, cholesteatomata

Treat **Radical mastoid**

(a) Exposure of antrum

(b) Removal of bridge between antrum and middle ear

(c) Toilet of middle ear

(d) Drainage

Ind (a) Exacerbation of chronic otitis

(b) Intra-cranial invasion

(c) Labyrinthitis

(d) Presence of

(1) Cholesteatomata

(2) Granulations

(3) Sinuses

(4) Caries

(5) Chronic discharge

Contraind (a) Antero-inferior perforation

(b) Central perforation

(c) Useful hearing present

Pre-oper treat : Removal of tonsils, adenoids etc.

Tech

(1) Incision as for Schwartz

(2) Detachment of soft meatus from bone

(3) Exposure of antrum and whole of mastoid

(4) Excision of post. bony wall of meatus

- (5) Careful division of bridge
  - (6) Scraping of middle ear
    - (a) Malleus
    - (β) Incus
    - (γ) Tympanum
  - (7) Clear all overhanging margins
  - (8) Plastic operation on the meatus by
    - (a) Enlargement of meatal opening
    - (β) Meato-choanal flap
    - (γ) Skin graft
  - (9) Closure of post-aural incision
  - (10) Packing with ribbon gauze in oily flavine
- After treat
  - (a) Change outer dressing 3rd day
  - (b) Change of pack 10th day
  - (c) Syringing 2nd week
- Oper. compl
  - (1) Injury to labyrinth
  - (2) Injury to stapes
  - (3) Injury to carotid artery
  - (4) Injury to jugular bulb
  - (5) Injury to semicircular canals
  - (6) Injury to facial nerve
  - (7) Injury to dura

*Main complications of otitis media*

- (1) Mastoiditis
- (2) Labyrinthitis
- (3) Osteomyelitis skull
- (4) Lateral sinusitis and jugular vein thrombosis
- (5) Meningitis
- (6) Intra-cranial abscess
  - (a) Extradural
  - (b) Subdural
  - (c) Brain
    - (α) Cerebral
    - (β) Cerebellar
- (7) Facial paralysis

(III) MASTOID:

(1) ACUTE MASTOIDITIS

Def Suppurative inflammation of mastoid antrum &/or accessory cells

- Path
  - (1) Varieties
    - (a) Conjuncto-phlegmon generalised
    - (b) Empyema
    - (c) Acute necrosis
  - (2) Factors
    - (a) Anatomical structure:
      - (α) Cellular bony affection
      - (β) Diplœtic
      - (γ) Eburnated
- } cranial extension



- (b) Nature of infection :  
 (α) Streptococcus fulminating  
 (β) Pneumococcus mld
- (c) Resistance of the patient Diabetes
- Clinic (1) Pain (α) Earache  
 (b) Headache  
 (2) Tenderness  
 (a) Tip  
 (b) Supra meatal triangle  
 (c) Posterior margin of the mastoid  
 (3) Swelling Above and behind the ear  
 (4) Displacement of auricle Anterior & lateral  
 (5) Otoscopy Perforated membrane  
 With (a) Cessation of discharge  
 (b) Too free discharge  
 (c) Œdema & swelling of posterior meatal wall
- (6) Pyrexia and toxæmia
- Clinical Types (1) Typical mastoiditis  
 (2) Mastoiditis with abscess  
 (3) Grumbling mastoiditis  
 Empyema in dense cortex  
 (4) Mastoiditis and otitis mucosus  
 (5) Zygomatic mastoiditis trismus  
 (6) Meatal mastoiditis
- Compl (1) Mastoiditis with neck extension  
 (a) Bezold's mastoiditis  
 Pus into sternomastoid sheath  
 (b) Digastric abscess Citelli  
 (2) Mastoiditis with pharyngeal extension  
 Retro-pharyngeal abscess  
 (3) Mastoiditis with petrosal infection  
 (4) Mastoiditis with cranial extension  
 Osteomyelitis cranium temporal occipital  
 (5) Mastoiditis with intra-cranial extension  
 (a) Sinus thrombosis → vein thrombosis  
 (b) Extra-dural abscess  
 (c) Meningitis  
 (d) Subdural abscess  
 (e) Cortical abscess (α) Cerebral  
 (β) Cerebellar
- Treat Mastoidectomy of Schwartze :
- Ind Every case of acute mastoiditis must be operated upon when  
 (a) One clean incision of the drum fails to relieve  
 (α) Pain  
 (β) Headache

- (r) Tenderness
- (s) Pyrexia
- (b) Mastoid tenderness after drum perforation
- (c) Onset of intra-cranial signs
  - (a) Headache
  - (β) Drowsiness
  - (r) Vertigo
  - (s) Facial paralysis
- (d) Pyrexia with profuse discharge
- (e) Swelling of roof and post. wall of bony meatus
- Time Immediate unless subsiding
- Anaesth Local or general
- Tech Stage I (a) Incision  $\frac{1}{2}$  behind pinnal attachment from top to mastoid tip  
(Avoid trauma to facial nerve in child)
- (b) Periosteal incision and detachment
- (c) Automatic retractor (self retaining)
- Stage II (a) Follow a sinus or carious bone upto the antrum or (β) Googe behind Henle's spine upto the antrum
- Stage III (a) Recognise the aditus
- (b) Exposure of the antrum
- (c) Exposure of accessory cells
  - (a) Antral cells   Supra—
  - Ante—
  - Retro—
  - (β) Zygomatic cells
  - (r) Apical cells
  - (s) Angular cells
  - (d) Exposure of lateral sinus
- Stage IV (a) Closure few interrupted sutures
- (β) Drainage tube
- After treat (1) Local
  - (a) Syringing 2nd day
  - (b) Change of pack 3rd day to 3 weeks
  - (c) Removal of tubes 5th to 10th day
- (2) General
  - (a) Sulphonamide group
  - (b) 10% saline 20 c.c.s. intravenously
- Oper compl (1) Failure to find antrum  
Hug the temporal floor and mental wall
- (2) Damage to lateral sinus  
Muscle or fascial graft pack
- (3) Injury to dura intra-cranial extension

- (4) Injury to facial nerve Facial paralysis  
 (a) Observe for facial twitches during operation if nerve is injured  
 ↓ (b) Immediate suture  
 or (c) Nerve graft inlay Dual Balance  
 (5) Injury to external semicircular canal

## (2) CHRONIC MASTOIDITIS

- Etiol (a) Acute mastoiditis  
 (b) Chronic otitis media  
 Path Chronic osteomyelitis and periostitis of mastoid  
 Clinic (1) History and signs of otitis media  
 (2) History or no history of acute mastoiditis  
 (3) Chronic abscess  
       Sinus  
       Granulations } over the mastoid  
 Compl As in otitis media and mastoiditis  
 Treat Radical mastoid (See under chronic otitis media)

## (IV) OTITIC LATERAL SINUS THROMBOSIS:

- Path Spread routes  
 (1) Extension Mastoiditis  
       ↓ Osteomyelitis  
       ↓ Peri-sinus abscess  
           (present or absent)  
       ↓ Pachymeningitis  
       ↓ Sinus thrombosis  
 (2) Venous Mastoiditis  
       ↓ Embolary mastoid phlebitis  
       ↓ Sinus thrombosis  
 (3) Labyrinth Mastoiditis  
       ↓ Labyrinthitis  
       ↓ Extra-dural abscess  
       ↓ Sinus thrombosis  
 (4) Post-operative Trauma  
 Clinic (A) General  
       (1) Continuance of pyrexia for more than 48  
           hours after mastoidectomy  
       (2) Oscillating temperature with rigors  
       (3) Pyrexia out of all proportions to local  
           conditions  
           More than 101  
 (B) Local  
       (1) Evidence of osteomyelitis over sinus wall  
       (2) Discoloration, granulations or peri-sinus  
           abscesses on the sinus surface  
       (3) Sinus resistant to delicate palpation

### Diagnosis Of side

Pressure on opposite jugular vein

↓ (g) Raises the cerebrospinal fluid pressure

+ (b) Engorges the optic disc

Comp (1) Septicæmia and pyæmia

(2) Jugular thrombosis

(3)	Abscess	(a)	Intra-dural
		(b)	Intra-cerebellar

(b) Intra-cerebellar

(4) **Pin-arachnoiditis**

(5) Encephalitis

(6) Cavernous sinus thrombosis

**Treat**   **Operative**

Schwartz + Lateral sinus + Int. jugular vein

Tech (1) Schwertsee

↓ (2) Incision along superior curved line of occlusal

↓ (3) Exposure of squamo-parieto-mastoid suture

↓ (4) Exposure of lateral stress

↓ (5) Plug between sinus and bone

↓ (6) Incision into the struts

↓ (7) Existence of the clot

↓ (8) Ligation of internal jugular vein

Ind (a) Pus and debris from jugular end of sinus

(b) No free flow of blood from jugular end

(c) Linear swelling in the neck

**Tech.** Incision along anterior border of sternomastoid

Place of lesion (a) Below the clot

(D) Above common facial vein

**Cut between two lectures**

### Drainage of orbital and

After treat (A) Dressalings

(s) Change of outer dressings after 24 hours

(b) Change of wound pack after 4 days

(c) Change of sinus plug after 8 days

(Ff) Blood transfusion

(C) Serum and vaccine treatment

(V) OTOGENOUS LEPTOMENINGITIS:

**Def** Pyogenic inflammation of pia-arachnoid

Path	Paths of infection
1	1
2	2
3	3
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100	100

### (1) Direct extension

(2) Anatomical channels

(3) Venous thrombosis

(4) Rupture of brain abscess

(5) Blood stream

Clinic (1) Headache

(2) Pyrexia

(3) **Stiff neck**

(4) Kernig

- (5) Irritation or coma
- (6) Eye signs papilloedema, nystagmus
- (7) Lumbar puncture fall of chlorides & glucose
- Treat (1) **Conservative** **Kubie's Forced Drainage**
  - (a) Lumbar puncture
  - + (b) Intravenous
    - 2 to 3 litres of 45% hypotonic saline in one to three hours
- (2) **Operative Drainage**
  - (A) Suppurative labyrinthitis with meningitis  
Trans-labyrinthine drainage
  - (B) Cortical abscess with meningitis  
Drainage of cortical abscess
  - (C) Sinus thrombosis with meningitis  
Drainage of sinus
  - (D) Mastoiditis with meningitis  
Drainage
    - Tech (a) Schwartz
    - (b) Exposure of sinus and cerebellum
    - (c) Excision of tegmen and squama
    - (d) Excision of zygoma
    - (e) Excision of solid angle of petrous
    - (f) Drainage of the area

## (VI) OTITIC INTRA-CRANIAL ABSCESS:

- Varities (A) **Extra-dural abscess**
  - (a) Over lateral sinus
  - (b) Over zygomatic region
  - (c) Over petrous region
- (B) **Subdural abscess**  
Above tegmen tympani
- (C) **Cortical abscess**
  - (a) Cerebral temporo-sphenoidal
  - (b) Cerebellar

- Pathology *Routes of infection*
  - (a) Direct extension
  - (b) Perivascular sheath
  - (c) Thrombosed veins
  - (d) Endarteritis and embolism
- (A) **Cerebral abscess**  
Direct extension through tegmen
- (B) **Cerebellar abscess** through
  - (a) Labyrinth
  - (b) Thrombosed lateral sinus
  - (c) Osteitis *Trautmann's triangle*

	<b>Stages</b>	(a) Spreading encephalitis (b) Encapsulation (c) Encapsulated softening
<b>Clinic</b>	(A) <b>Sepsis</b>	(1) Local focus ear mastoid (2) General toxemia (a) Active (b) Passive (3) Laboratory (a) Leucocytosis (b) C. S. Fluid
	(B) <b>Intra-cranial pressure</b>	(1) Headache (2) Affections of consciousness (3) Vomiting (4) Papilloedema (5) Bradycardia (6) High blood and C. S. F pressure
	(C) <b>Localising signs</b>	(1) <b>Cerebral abscess</b> temporo-sphenoidal (a) Word amnesia (b) Homonymous contra lateral hemianopia (c) Ocular palsies (d) Contra lateral hemiplegia (e) Contra lateral hemi-anesthesia (2) <b>Cerebellar abscess</b> (a) Asynergia (b) Hypermetria (c) Dysdiadochokinesis (d) Hypotonia and paresis (e) Cerebellar catalepsy (f) Nystagmus and skew deviation (g) Ataxy and vertigo
	(D) <b>Special signs and investigations</b>	(a) Stereoscopic X Ray films (b) Lumbar puncture (c) Ventricular puncture
<b>Diff. diag</b>	(1) Encephalitis lethargica (2) Cerebrospinal meningitis (3) Otitic hydrocephalus (4) Otitic extra-cranial complications (5) Other causes of intra-cranial tension rise	
<b>Treat</b>	<b>Operative</b>	
<b>Ind</b>	(A) <b>Urgent decompression</b> In acute stage (B) <b>Secondary drainage</b> Extension of ear operation	

**(C) Primary drainage****(a) Good encapsulation**

4-6 weeks after the advent of intracranial signs

**(b) Clear cerebrospinal fluid with intracranial signs**

Tech (1) Ear or mastoid operation

↓ (2) Exposure of dura in suspected area

**(A) Cerebellar**

(a) Medial extension through internal ear

(b) Posterior extension internal to lateral sinus

(c) Independent through suboccipital region

**(B) Cerebral**

Superior extension through tegmen

↓ (3) Inspection of dura mater

(a) Fistulae, granulations, abscesses, adhesions

(b) Signs of brain abscess

(a) Extension of septa inside dura

(β) Absent dural pulsations

(γ) Hernia cerebri

↓ (f) Incision of dura mater

↓ (5) Exploration of the brain:

By needles and fingers

↓ (6) Drainage:

(a) Superficial abscess open drain

(f) Deep abscess closed drain

or (6) Enucleation of the whole cortical abscess

After treat See under brain abscess

**IMPORTANT POINTS**

- (1) Forceps are the most useless and dangerous weapons for the removal of a foreign body from a ear
- (2) Pain due to furuncle ear is worse on mastication or by pulling on or pressing the pinna or meatus pain due to mastoiditis is unaffected.
- (3) Furunculosis of the meatus
  - (a) Look for ear disease
  - (b) Look for general disease.
- (4) If after a conscientious examination you cannot differentially diagnose between furuncle and mastoiditis, patient may have both.
- (5) If after post-aural incision for post-aural meatal furuncular abscess, bare bone is found, it is mastoiditis.
- (6) Examination of the drum should be the routine in all cases of unexplained pyrexia in children and in all cases of cerebral signs whatever the age.

- (7) Otitis media treatment
  - (a) Subsiding otitis media without perforation drum  
Conservative
  - (b) Subsiding otitis media with perforation drum  
Conservative and observative
  - (c) Acute signs with bulging drum  
Incise the drum
  - (d) Acute signs with perforation drum  
Enlarge the perforation.
- (8) If pain and pyrexia return or continue after an incision of the drum  
Explore the mastoid.
- (9) Tenderness over the mastoid in the presence of free discharge  
Mastoiditis.
- (10) Intra-cranial invasion in acute mastoiditis is suggested by
  - (a) Slow pulse rate
  - (b) Persistent headache
  - (c) Drowsiness
  - (d) Squint
  - (e) Vertigo
- (11) Accessory mastoid cells
  - (a) Squamous
  - (b) Sub-labyrinthine
  - (c) Sinus plate
  - (d) Marginal
  - (e) Tip
  - (f) Retro-facial
  - (g) Peri-tubal
  - (h) Floor of the middle fossa
  - (i) Zygomatic
  - (j) Petrosal
- (12) Radical mastoid operation should never be undertaken on an ear in which there is useful hearing unless there are serious complications.
- (13) Chronic otitis media is the result of acellular mastoid.
- (14) Never curette inner wall of the middle ear as it contains
  - (a) Facial nerve
  - (b) Labyrinth
  - (c) Carotid canal.
- (15) Persistence of pain and temperature in the presence of free discharge
  - (a) Mastoiditis?
  - (b) Labyrinthitis?
  - (c) Lateral sinus thrombosis?
  - (d) Meningitis?
- (16) Posterior perforation in tympanum mastoiditis



- (17) Stages of radical mastoid
- Schwartze
  - Exposure and removal of osseous mental wall
  - Removal of outer wall of attic
  - Removal of ossicles
  - Plastic stage
  - Drainage.
- (18) Main complications of otitis media
- Mastoiditis
  - Labyrinthitis
  - Osteomyelitis cranium
  - Lateral sinus thrombosis → jugular vein thrombosis
  - Meningitis
  - Intra-cranial abscess
    - Extra-dural
    - Subdural
    - Cortical
      - Cerebral
      - Cerebellar
  - Facial paralysis.
- (19) In every case of otitis and ear trouble examine the pharynx, tonsils and adenoids.
- (20) Temperature over 101 in an adult with mastoiditis, examine the lateral sinus.
- (21) If there is septicaemia without thrombosis, do not disturb the sinus.
- (22) Treatment of septic sinus thrombosis
- Removal of the whole infected bone
  - Isolation of infected area from general circulation by ligature between the focus and heart
  - Drainage of the infected sinus
- (23) Except for extra-dural abscess, lateral sinus thrombosis is the most common intra-cranial complication of ear trouble.
- (24) Do not tie internal jugular vein without dealing with infected sinus otherwise thrombosis will extend high up.
- (25) *Condition of the cerebro-spinal fluid is the most reliable test of the stage of cortical abscess*
- Turbid fluid with cells and organisms  
Encephalitis
  - Clear fluid with intra-cranial signs  
Intra-cortical abscess.
- (26) Clinical signs of Intra-cranial abscess
- Sepsis
    - Septic focus
    - General toxemia
      - active
      - passive
    - Leucocytosis
    - Cerebro-spinal fluid

## (B) Intra-cranial pressure

- (a) General
- (1) Headache
  - (2) Vomiting
  - (3) Papilloedema
  - (4) Bradycardia
  - (5) High blood and C. S. F. pressure.

## (b) Anterior chamber

Affections of consciousness.

## (c) Posterior chamber

- (a) Retraction of head
- (b) Stiff neck
- (c) Kernig

## (C) Localising

- |                |   |                                |
|----------------|---|--------------------------------|
| (a) Functional | } | (a) Cerebral<br>(b) Cerebellar |
| (b) Sensory    |   |                                |
| (c) Motor      |   |                                |
| (d) Reflex     |   |                                |
| (e) Trophic    |   |                                |

## (27) Important clinical signs of intra-cranial tension are

- (a) Headache
- (b) Papilloedema
- (c) Bradycardia
- (d) Affections of consciousness.

(28) Clinical signs of Intra-cranial tension + Ear focus  
= Intra-cranial complication of ear disease.

## (29) No case of brain abscess is inoperable until the patient is actually dead.

## (30) Preliminary treatment of tonsils and adenoids is essential in every case of ear trouble.

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## CHAPTER IV

# THE NECK

### (1) CONGENITAL ABNORMALITIES:

#### (1) DERMoids

Etio	Adolescents
Path	Sequestration
Clinic	Midline, subcutaneous, globular cystic tumour
Diff. diag	From any other cystic swelling
	(a) Thyroglossal cyst
	(b) Perichondral thyroid abscess
	(c) Subhyoid bursa
Treat	Excision

#### (2) BRANCHIAL ABNORMALITIES

##### (A) BRANCHIAL CYST

Def Distension cyst in connection with an unobliterated portion of branchial cleft

Etio Early adult life

Path (a) Wall

- (a) External cyst squamous lined
- (b) Internal cyst columnar lined

(b) Contents

- (a) Cholesterol crystals
- (b) Sebaceous material in external cyst
- (r) Glairy fluid in internal cyst

(c) Sites

(1) Third cleft: Precervical sinus

- (a) Below and behind mand. angle
- + (b) Behind ant. border of sternomastoid
- + (r) Level of hyoid or thyroid cartilage

(2) Second cleft

*Below the mastoid*

*Extending towards the floor of the mouth*

Clinic Globular cystic swelling at the special sites

Diff. diag (a) Caseous tuberculous gland cold abscess  
(b) Sebaceous cyst  
(c) Aneurysm

Compl. (a) Sepsis  
(b) Malignancy

Treat Excision

**(B) BRANCHIAL SINUS****Etiol** Infancy**Path** (a) Origin

Failure of obliteration of cervical sinus

(b) Morb. anat

Columnar lined tract from inferior cervical region to tonsillar fossa passing between the carotids

(c) Site

(a) Above the sternoclavicular point

+ (β) Anterior to the sternomastoid

**Clinic** Chronic sinus opening at the special site**Diag** (a) Subcut. purse-string suture (pre-operative)

(b) X Rays after lipiodol

**Treat** Excision

(a) Incision low collar surrounding the opening

↓ (b) Dissection of the tract upto thyroid cart. level

↓ (c) Incision collar at the level of thyroid cart.

↓ (d) Dissection deep

**(C) BRANCHIAL CARTILAGE**

Persistent cartilage at the site of one of the branchial clefts

**(D) CERVICAL AURICLE**

Pendulous skin fold in the lower cervical region

**(3) THYROGLOSSAL ABNORMALITIES**

(See under Thyroid)

**(A) LINGUAL THYROID****(B) THYROGLOSSAL CYST****(C) THYROGLOSSAL SINUS****(D) ABERRANT THYROID****(II) TRAUMA:****(1) WOUNDS OF THE NECK****Varieties** (A) Cut throat

(a) Suicidal

(a) High situation

Between hyoid and thyroid cart.

(β) Wound from left to right

(in right handed)

(γ) Respiratory passages bear the brunt

(b) Homicidal

(a) Low situation

(β) Arteries bear the brunt

**(B) Stab wounds :**

- (a) Root of the neck
- (b) Complications out of proportion to external wound
  - (a) Haemorrhage
  - (b) Trauma to
    - (1) Respiratory passages
    - (2) Oesophagus
    - (3) Nerves
    - (4) Spine

Compl (1) Traumatic Trauma to deeper structures  
 (2) Septic Infection and its consequences

**Treat (A) Mild cases**

- (a) Excision of ragged edges
- (b) Exploration
- (c) B.I.P.P. of exposed tissues
- (d) Closure without drainage

**(B) Serious cases****(a) Free exposure and exploration of :**

- (1) Pharynx, larynx trachea
- (2) Oesophagus
- (3) Great vessels
- (4) Nerves
- (5) Thoracic duct

**(b) Treatment of affected structures****(c) Closure**

With
 

- (1) Drainage
- (2) Laryngotomy
- or (3) Tracheotomy

 } If required

**(C) Gunshot wounds (Dollfus case)****(2) FRACTURE-DISLOCATIONS OF CERVICAL SPINE (See under spine)****(III) ACUTE INFLAMMATIONS OF THE NECK :****(A) SUPERFICIAL To the deep fascia****(1) CARBUNCLE (See under skin)**

Site Nape of the neck

**(2) ERYSIPELAS (See under skin)****(3) ANTHRAX (See under anthrax)****(4) SECONDARY To deeper foci lymphadenitis etc.****(B) DEEP To the deep fascia****(1) CERVICAL CELLULITIS**

Etiol (a) Primary primary focus in the neck

## (b) Secondary

(a) Oral sepsis → lymphadenitis → cellulitis

(β) Extension of Parotitis mastoiditis  
Mandibular osteomyelitis

Clinic (a) Diffuse, spreading brawny inflammatory swelling

(b) General toxæmia

Treat (1) General sulphonamide group

(2) Specific sera

(3) Local

(a) Conservative rest, heat, rubefacients

(b) Operative Transverse incisions

Hilton's method

Hypertonic packs

Rubber tissue drainage

Post. treat Keep the tracheotomy set ready at hand

## (2) LUDWIG'S ANGINA

Def Diffuse cellulitis of

(a) Submaxillary region

+ (b) Floor of the mouth

Etiol Septic focus in submaxillary region or oral cavity

Path : Streptococcus or special bacillus

Clinic (a) Diffuse, indurative, inflammatory submaxillary and submental swelling

+ (b) Œdema of the floor of the mouth

↓ Displacement of the tongue

Diff. diag (a) Acute osteomyelitis jaw

(b) Acute submaxillary lymphadenitis

(c) Acute submaxillary sialo-adenitis

Treat (1) Conservative (See above)

(2) Operative

(a) Anæsth (a) Cervical block

(β) Chloroform (avoid ether)

(b) Tech (a) Incisions

(1) Symphysis menti to hyoid

or (2) Along the lower border of the jaw

(β) Evacuate by Hilton's method

(γ) Division of myelohyoid fibres

(δ) Drainage

(c) Post. treat (a) Local Hypertonic saline pack

or Saturated mag. sulph. pack

or 10% glycerine ichthyol

Rubber tissue drain

(β) General Sulphonamide group

Antisera

*Complications* Of any acute inflammation in the neck

- (1) **Edema of the glottis**
- (2) **Aspiration pneumonia**
- (3) **Sloughing**
- (4) **Secondary hæmorrhage**
- (5) **Venous thrombosis** → septic embolism
- (6) **Mediastinitis**

(3) **ACUTE CERVICAL LYMPHADENITIS**  
(See below)

(4) **ACUTE TUBERCULOUS CELLULITIS OR PERILYMPHADENITIS**

Complication of tuberculous lymph glands

(5) **ACUTE THYROIDITIS** (See under Thyroid)

#### (IV) **CHRONIC INFLAMMATIONS OF THE NECK:**

(1) **CHRONIC CERVICAL CELLULITIS**

*Etiology* Secondary to (a) Acute cellulitis  
(b) Chronic septic focus in the neck  
(c) Spreading cellulitis elsewhere

(2) **CHRONIC TUBERCULOUS CELLULITIS**

*Syn* T B. peri-adenitis

*Etiology* Secondary to chronic tuberculous lymph glands

(3) **ACTINOMYCOSIS**

*Site* Below and behind the angle of the jaw

*Clinic* (a) Multiple sinuses with widespread fibrosis  
(b) Diffuse induration  
(c) Yellow granules in the discharge  
(d) Lymph glands not involved

*Treat* (1) Heavy doses of Pot. Iodide  
Iodised milk

(2) Scraping

(4) **SUBCUTANEOUS OR MUSCULAR GUNMA**

With secondary infection

(5) **LYMPHANGIOMATOUS CELLULITIS**

*Clinic* Recurrent attacks of streptococcal lymphangitis  
in cystic hygroma

*Treat* (a) Sulphonamide group  
(b) Anti-streptococcal serum

(6) **WOODY PHLEGMON OF RECLUS**

*Path* Chronic staphylococcal cellulitis of the neck

*Clinic* Extreme chronicity and induration

*Diff diag:* (a) Actinomycosis  
(b) Malignancy  
(c) Syphilis

# (V) AFFECTIONS OF THE CERVICAL LYMPH SYSTEM (See under Lymphatics)

## (1) TRAUMA TO THORACIC DUCT

Etio (a) Stab wounds  
(b) Operative trauma

Clinic (1) Lymphorrhoea  
(2) Chylorrhoea after meals

Compl Inanition cachexia

Treat (a) Conservative pressure bandage  
(b) Operative ligature

## (2) ACUTE SEPTIC LYMPHADENITIS

(See under Lymphatics)

Etio Septic (a) Teeth  
(b) Tongue  
(c) Tonsils  
(d) Ear  
(e) Scalp

Clinic (a) Stage of pain and stiffness  
↓ (b) Stage of tender localised induration  
↓ (c) Stage of acute lymphadenitis  
↓ (d) Stage of acute periglandular cellulitis  
↓ (e) Stage of acute glandular abscess  
(a) Superficial  
(β) Retropharyngeal

Treat (1) Conservative in early stages  
↓ (2) Operative in suppuration

## (3) CHRONIC SEPTIC LYMPHADENITIS

(See under Lymphatics)

Etio (1) Primarily chronic  
(2) Secondary to acute lymphadenitis  
Primary foci (See above)

Clinic (a) Chronically enlarged and tender but mobile glands, with a primary chronic septic focus in catchment area  
(b) Chronic unresolving mass, persisting after the opening of a glandular abscess

Treat Excision

## (4) TUBERCULOUS CERVICAL ADENITIS

(See under Lymphatics)

### (A) General:

Etio General tuberculous diathesis

Clinic Discrete, palpable enlargement of all glands with no peri adenitis.



- Treat (a) General anti-tuberculous treatment  
 Heliotherapy ultra violet rays  
 (b) Avoid operative interference  
 Unless conservative

(B) Local:

Eti Some local focus Tonsil

Clinic (a) Tender fleshy enlargement of a gland with  
 a chronic septic primary focus

↓ (b) Discrete enlargement of surrounding glands

↓ (c) Peri-adenitis and matting surrounded by  
 discrete glands

↓ (d) Central caseation, surrounded by peri-adenitis  
 and matted glands, surrounded by discrete  
 enlarged glands

↓ (e) Tuberculous cellulitis

↓ (f) Tuberculous abscess  
 Collar stud retropharyngeal

↓ (g) Tuberculous ulcer or sinus

Compl (1) Implication of important structures

(2) Pressure syndrome

(3) Tuberculous cellulitis

(4) Cold abscesses

(5) Scrofuloderma

Treat (1) Conservative ultra violet exposures

(2) Operative

Ind (a) Single gland or group of glands  
 not subsiding or progressing  
 under conservative treatment

(b) Local and regional disease

(c) Caseation and collar-stud abscess

Contraind (a) Diffuse involvement

(b) Massive involvement

(c) Bad general condition

Tech (1) Un-complicated mass  
 Excision

(2) Mass with caseating foci  
 Drainage of caseating material  
 ↓ Excision

(3) Mass with scrofuloderma  
 Scraping and B I. P P  
 ↓ Excision

(4) Collar stud abscess  
 Incision and drainage  
 + Dilation of fascial hiatus  
 + Scrape out the gland

Post treat General and local anti tuberculous

## (5) SYPHILITIC CERVICAL ADENITIS

- Clinic (1) Discrete mobile, fleshy or shotty generalised enlargement all glands being of uniform moderate size  
 (2) Enlarged glands in other regions  
 (3) Other evidence of syphilis

## (6) NEW GROWTHS OF CERVICAL LYMPH SYSTEM

## (A) LYMPHANGIOMA

- (a) Cystic hygroma Hydrocele of the neck  
 Etio Infants and children  
 Site Supraclavicular → axilla or mediastinum  
 Clinic Multilocular thin walled, translucent, bluish swelling  
 Compl Recurrent streptococcal inflammatory attacks  
 Treat (1) Conservative In children and large cases  
 (2) Anti streptococcal treatment  
 (b) Solitary lymph cyst  
 Etio Adults  
 Site Supraclavicular  
 Clinic Thin walled translucent bluish cyst  
 Treat (a) Sclerosing injections quinme urethane  
 (b) Marsupialisation with gauze pack  
 Post. compl (a) Cellulitis  
 (b) Sinus formation with lymphorrhoea

## (B) HODGKIN'S DISEASE

- Clinic (a) Discrete rubbery big enlargement of one group → enlargement of other groups (axilla, groin mesentery)  
 (b) Enlarged spleen  
 (c) Anaemia  
 (d) Pel Ebsstein syndrome  
 Diag Biopsy  
 Compl Pressure effects  
 Treat (a) Deep X Rays  
 (b) Arsenic

## (C) LYMPHO-SARCOMA

- Clinic Enlargement of local glands  
 (a) Rapid, extensive infiltrating growth  
 (b) Infiltration of other structures with its consequences  
 Treat Deep X Rays

## (D) SECONDARY CARCINOMATOUS OR SARCOMATOUS GLANDS

- Clinic (a) Hard or soft infiltrating mass of glands

(b) Primary malignancy in catchment area

(1) Tongue

(2) Tonsils

(3) Jaw

(4) Pharynx

(5) Larynx

Compl (a) Infiltration of other structures

(b) Fungation

(1) Sepsis

(2) Secondary hæmorrhage

(c) Occasionally softening

## SUPRA CLAVICULAR MALIGNANT ADENOPATHY

Etio Carcinoma

(a) Breast

(b) Thyroid

(c) Oesophagus

(d) Intra-abdominal

(e) Testis

## (VI) AFFECTIONS OF THE CERVICAL VESSELS:

(See under Vessels)

### (1) ANEURYSMS

Sites (A) Common carotid

Site Bifurcation

Clinic (a) Local pulsatile swelling

(b) Pressure syndrome

(1) Nerves

glossopharyngeal

vagus

accessory

hypoglossal

cervical plexus

brachial plexus

(2) Trachea dyspnoea

(3) Oesophagus dysphagia

(4) Larynx displacement

(c) Intra-cranial symptoms

pain and noises

vertigo

hemiplegia

Treat (See under Vessels)

Post compl Cerebral

**(B) Subclavian**

Site	First and third parts
Etio	Right side, men
Clinic	(a) Local pulsatile swelling
	(b) Pressure syndrome
	(1) Dilated superficial veins
	(2) Brachial neuralgia
	(3) Paresis of the arm
	(4) Oedema of the arm
	(5) Erosion of the clavicle
Treat	(See under Vessels)
Post. compl	Gangrene of the superior extremity

**(2) THROMBO-PHLEBITIS Internal jugular vein**  
(See under Ear)

Etio	Spread from lateral sinus thrombosis
Clinic	(a) All signs of lateral sinus thrombosis
	+ (b) Tender cord like swelling in the neck
Treat	(1) Ligature between the thrombus and heart
	↓ (2) Thrombectomy and drainage of cranial end

**(3) VASCULAR NEW GROWTHS****(A) HÆMANGIOMA**

Clinic	Deep, non translucent, sponge-like, compressible
--------	--

**(B) CAROTID BODY TUMOUR**

Syn	'Chromaffin tumour'
	'Potato tumour'
Path	(a) Innocent endothelioma
	(b) Malignant
Site	Carotid bifurcation
Clinic	Pulsatile (non-expandile), painless, slow round, lobulated, encapsuled, firm tumour
Diff diag	(a) Aneurysm
	(b) Enlarged lymph gland
	(c) Aberrant thyroid
Compl	Malignant degeneration
Treat	(a) Preliminary ligature of common carotid
	↓ (b) Excision of the tumour together with the carotid bifurcation

**(VII) NEW GROWTHS IN THE NECK:****(1) SUBCUTANEOUS TISSUE GROWTHS****(A) LIPOMA**

Sites	(a) Sub-mandibular
	(b) Sub-occipital (? meningocele)
Clinic	Diffuse or big localised
	<b>(B) NEURO FIBROMA</b> molluscum fibrosum

- (C) LYMPHANGIOMA (See above)
  - (1) Cystic hygroma Hydrocoele of the neck
  - (2) Solitary lymph cyst
- (D) HÆMANGIOMA
- (2) LYMPHATIC GLANDULAR GROWTHS
  - (A) LYMPHADENOMA
  - (B) LYMPHOSARCOMA
  - (C) SECONDARY GLANDULAR CARCINOMA OR SARCOMA
- (3) GROWTHS FROM SPECIAL ORGANS (See under those organs)
  - (A) Salivary gland Mixed tumour
  - (B) Pharynx and Larynx :
    - (1) Naso-pharyngeal
    - (2) Oro-pharyngeal
    - (3) Epi laryngeal
    - (4) Pyriform fossa
    - (5) Laryngeal intrinsic
    - (6) Hypo-pharyngeal
- (C) Thyroid
- (D) Œsophagus
- (4) GROWTHS SPECIAL
  - (A) CAROTID BODY TUMOUR (See above)
  - (B) BRANCHIOGENETIC CARCINOMA
    - Path Squamous carcinoma in branchial remains
    - Clinic Deep squamous carcinoma with
      - (a) No primary focus
      - (b) Not situated in a lymph gland
      - (c) Situated at the site of branchial cleft

## (VIII) DEFORMITIES OF THE NECK :

### (1) TORTICOLLIS

Def Deformity of the neck causing deviation and rotation of the head due to permanent shortening or spasm of the muscles on one side

- Varieties
- (1) Congenital Sternomastoid tumour  
↓ Myositis fibrosa
  - (2) Acquired
    - (A) Traumatic
    - (B) Spastic :
      - (a) Trauma
      - (b) Inflammation
      - (r) Nervous

- (C) **Reflex**
  - (a) Inflammatory focus
  - (b) T. B. spine
- (D) Compensatory scoliosis
- (E) Spasmodic habit tics
- (F) **Mechanical Scars**
- (G) Ocular habit
- (H) Paralytic infantile paralysis
- (I) Hysterical
- (A) **Acute Painful**
  - (1) **Spastic**
    - (a) Trauma
    - (b) Inflammation
    - (c) Nerve irritation
  - (2) **Reflex**
    - (a) Acute inflammatory focus
    - (b) T. B. spine
- (B) **Chronic Painless**
  - (1) **Congenital**
  - (2) **Compensatory**
  - (3) **Mechanical**
  - (4) **Paralytic**
  - (5) **Ocular**
  - (6) **Spasmodic**
- Clinic (1) **Position**
  - (a) Head drawn to same side
  - + (b) Face turned to opposite side
  - + (c) Chin tilted up and pointing to opposite clavicle
- (2) **Limitation of opposite movements**
  - (a) Painful and spastic in acute cases
  - (b) Painless and non-spastic in chronic cases
- (3) **Deformity**
  - (a) Prominently standing sternomastoid
  - (b) Compensatory spinal scoliosis
- (A) **Congenital**
  - (1) History of difficult labour
  - ↓ (2) Sternomastoid tumour in childhood
  - ↓ (3) Myositis fibrosa (See under Muscles)
- (B) **Acute reflex**
- Etiology Acute inflammatory focus
  - (a) Lymphadenitis
  - (b) Acute abscess
  - (c) Spinal tuberculosis
- Clinic Painful spasm
- Treat Treat the primary focus

## (C) Spasmodic

- Etiol** Neurotic temperament  
Overwork or worry
- Path** Disturbance of cortical centres for head movements
- Clinic** Spasmodic clonic rotatory movements of the head only during the day
- Treat** (1) Fixation in Plaster-of Paris  
(2) Resection  
    (a) Spinal accessory  
    (b) Post. divisions of upper cervical nerves  
(3) Physiotherapy and suggestion
- Treat** Of torticollis in general  
(1) Manipulations  
    With (A) Massage and physiotherapy  
        (B) Retentive apparatus  
(2) Sternomastoid tenotomy  
    (a) Subcutaneous: When shortening  $< 1$   
    (b) Open  
        (a) Low tenotomy  
            (1) Incision  
                : Parallel or across  
                Low down with skin pulled up  
            (2) Division: Sternal tendon  
                ↓ Clavicular head  
                ↓ Deep cervical fascia  
                (Save int. jug. vein by using a director)  
            (3) Stretching head into correct position  
        (b) High tenotomy  
            Stripping muscle insertion from mastoid  
(3) Tendon lengthening:  
    (1) Incision: along natural fold  
    (2) Division  
        (a) Sternal head close to the bone  
        (b) Clavicular head below spinal accessory  
        (c) Deep fascia  
    (3) Corrective manipulations  
    (4) Suture of the sliding heads
- After treat** (1) Mobile:  
    (a) Fixation  
        Method Sand bags or bandage  
        Position Over-corrected  
        Time 15 days  
    (b) Movements passive and active from 4th day

- (2) Fixed Fixation  
 By Plaster of Paris  
 In Over-corrected position  
 For 6-8 weeks

(2) NECKLESS Klippel Foil disease

- Etio Congenital  
 Path Fused short vertebral mass  
 Clinic (a) Absence of neck  
 (b) Limitation of head movements  
 (c) Spinal deformity  
 Associate Cervical spina bifida  
 Diff. diag (1) Pott's disease  
 (2) Torticollis  
 Compl Death under anaesthesia  
 Treat Plastic operation on skin and deep fascia (Gillies)

(IX) OTHER CONDITIONS IN THE NECK:

(A) STERNOMASTOID MUSCLE

- (1) Sternomastoid tumour (See under Muscles)  
 Difficult labour  
 ↓ Birth trauma  
 ↓ Thrombosis and rupture of muscle veins  
 ↓ Firm, spindle-shaped swelling  
 ↓ Congenital torticollis  
 (2) Sternomastoid gumma  
 Firm, rounded swelling in the muscle  
 ↓ Indolent infiltration of subcutaneous tissues  
 ↓ Secondary infection  
 ↓ Liquefaction  
 ↓ Gummatous ulcer

(B) CERVICAL RIB (See under Nerves)

- Etio Women after 40  
 Familial  
 Bilateral  
 Path }  
 Clinic } (See under Brachial plexus)  
 Diff diag }  
 Treat }  
 Tech Division of scalenus anticus: For scalenus syndrome  
 (a) Incision Sternoclavicular joint  
 ↓ Posterior triangle of the neck  
 (b) Division of sternomastoid origin  
 (c) Retraction medial of phrenic nerve  
 (d) Division of scalenus anticus origin  
 (e) Save phrenic nerve  
 pleural dome  
 subclavian artery



## (C) TUBERCULOSIS OF CERVICAL SPINE

(See under Spine)

## (X) OPERATIONS ON THE NECK:

- Preparation**
- (1) Efficient face screen
  - (2) Efficient isolation of the operative field by towels  
Hair exclusion
  - (3) Sand-bag under the shoulders with depression of the shoulders
- Anaesthesia**
- (1) Local infiltration
  - (2) Regional block
    - (a) Peripheral branches  
: Behind the midpoint of posterior border of sternomastoid
    - (b) Cervical plexus  
Behind the transverse processes of 2nd, 3rd and 4th cervical vertebrae
- Incisions**
- (1) Along the natural folds Collar
  - (2) Along the sternomastoid
  - (3) Triradiate
    - (a) Along sternomastoid upto hyoid
    - + (b) From (a) to symphysis menti
    - + (c) From (a) to mastoid
  - (4) Angular
    - (a) Along sternomastoid
    - ↓ (b) Along clavicle
- Important structures**
- (1) Nerves
    - (a) Cervical branch of facial and facial itself
    - (b) Spinal accessory
    - (c) Lingual
    - (d) Hypoglossal
    - (e) Glossopharyngeal
    - (f) Phrenic
    - (g) Vagus
    - (h) Recurrent laryngeal
    - (i) Brachial plexus and its supra-clavicular branches
    - (j) Sympathetic chain
  - (2) Vessels
    - (a) Carotid arteries
    - (b) Internal jugular vein
    - (c) Subclavian vessels
    - (d) Vertebral vessels
  - (3) Dome of the pleura
  - (4) Floor of the mouth
  - (5) Pharynx → respiratory + alimentary passages
- Special compl**
- (a) Asphyxia
  - (b) Air embolism
- Sutures**
- (a) Always approximate the platysma
  - (b) Subcuticular sutures
- Dressings** Avoid tension and movements

## (XI) IMPORTANT POINTS

## (1) Swellings in the neck

## (A) Cystic swellings

- (1) Sebaceous cyst
  - Fixed to the skin at one point
- (2) Dermoid cyst
  - (1) Midline, entirely subcutaneous
  - (2) Contains sebaceous material
- (3) Branchial cyst
  - (a) Below and behind mandible
  - (b) Deep to the sternomastoid
  - (c) Does not move on deglutition
  - (d) Contains cholesterol and sebaceous material
- (4) Thyroglossal cyst
  - (1) Midline near hyoid
  - (2) Moves on deglutition
  - (3) Contains mucoid fluid
- (5) Collar stud abscess
  - (a) Position of lymph glands
  - (b) Other glands enlarged
  - (c) Inflammatory swelling
  - (d) Non-defined walls
- (6) Deep cold abscess
  - (1) Primary focus spine
  - (2) Site of pointing posterior triangle
  - (3) Non-defined walls
- (7) Cystic hygroma
  - (a) Multilocular undefined limits
  - (b) Thin-walled, bluish and translucent
  - (c) Supra-clavicular
- (8) Lymph cyst
  - (1) Unilocular single
  - (2) Thin walled, bluish, translucent
  - (3) Supra-clavicular
- (9) Sub-hyoid bursa
  - (a) Midline attached to hyoid
  - (b) Moves on deglutition
- (10) Perichondral abscess
  - (1) Midline or near the midline
  - (2) Attached to thyroid cartilage
  - (3) Non-defined walls
  - (4) Inflammatory
  - (5) Moves on deglutition
- (11) Aneurysm
  - Pulsating swelling in the line of artery

## (12) Blood cyst

Association with vein or cavernous angioma

## (B) Swellings containing air :

- (1) Oesophageal pouch } Fill up on taking food or
- (2) Pharyngeal pouch } drink
- (3) Laryngocoele  
Connection with larynx
- (4) Pneumatocoele
  - (a) Supra-clavicular
  - (b) Compressible
  - (c) Impulse on cough or strain
- (5) Surgical emphysema  
Crepitant feel

## (C) Solid swellings :

- (1) Lipoma
  - (a) Diffuse, lobulated
  - (b) Sub-mandibular or sub-occipital
- (2) Neuro-fibroma
  - (a) Molluscum fibrosum  
Small, pedunculated compressible
  - (b) Plexiform Cord like feel
- (3) Angioma Compressible, sponge-like
- (4) Lymph glands
  - (a) Septic Primary focus
  - (b) T. B. Peri-adenitis and caseation
  - (c) Syphilis Discrete, generalised, small
  - (d) Hodgkin Discrete large, rubbery
  - (e) Lympho-sarcoma Rapid infiltrative
  - (f) Secondary carc. Primary malignant focus
  - (g) Lymphatic leukaemia
    - (1) Soft, generalised
    - (2) Blood picture
- (5) Sternomastoid
  - (a) Tumour Infants with difficult labour history
  - (b) Gumma Adults with syphilitic stigmata
- (6) Salivary gland Parotid, submaxillary
  - (a) Chronic inflammation
    - Position } tender
    - Duct orifice }
  - (b) Mixed tumour
    - Position } non-tender
    - Lobulation }
- (7) Goitre
  - (a) Situation
  - (b) Shape
  - (c) Movement on deglutition
  - (d) Associated special signs.
- (8) Accessory thyroid.
- (9) Carotid body tumour
  - (a) Situation
  - (b) Non-expansile pulsation
- (10) Branchiogenetic carcinoma

**(D) Pulsating swellings**

- (1) Aneurysm expansile
- (2) Carotid body tumour non-expansile

**(E) Midline swellings**

- (1) Deep or plunging ranula
- (2) Subhyoid bursitis
- (3) Thyroglossal cyst
- (4) Sequestration dermoid
- (5) Adenoma isthmus of the thyroid
- (6) Thyroid cartilage cold abscess
- (7) Lipoma diffuse submental
- (8) Sub-mental lymphadenitis

**(F) Swellings mobile on deglutition**

- (1) Thyroid adenoma or goitre
- (2) Thyroglossal cyst
- (3) Thyroid cartilage cold abscess
- (4) Subhyoid bursa.

**(2) Sinuses and fistulae in the neck**

- (1) Cervical sinus (a) Children  
(b) Low in the neck, lateral to midline
- (2) Thyroglossal sinus (1) Midline, round about the hyoid  
(2) Mobile on deglutition
- (3) Tuberculous sinus Primary focus : lymph gland, spine
- (4) Septic sinus - Primary focus : Osteomyelitis jaw  
Perichondritis thyroid  
Glandular abscess  
Infected cysts
- (5) Actinomycosis (a) Multiple sinuses  
(b) Fibrosis with induration  
(c) Granules in discharge  
(d) Site below and behind angle of the jaw

**(3) Acute inflammations in the neck**

- (1) Boil
- (2) Carbuncle
- (3) Cellulitis (a) Ludwig's angina  
(b) Cervical cellulitis
- (4) Erysipelas
- (5) Acute lymphadenitis
- (6) Acute osteomyelitis jaw
- (7) Septic thrombosis of internal jugular vein
- (8) Anthrax.

**(4) Congenital affections :**

- (a) Cholesterol crystals are pathognomonic of the contents of a branchial cyst

- (b) Congenital cysts in the neck
  - (1) Thyroglossal
  - (2) Branchial
  - (3) Dermoid
- (c) Remember thyroglossal cyst whenever there is any suppurative or sinus in the submental or subhyoid region
- (d) Contents from dermoid and external branchial cyst are sebaceous
- (e) Contents from thyroglossal cyst or sinus, and deep branchial cyst are mucoid
- (f) Any unexplained tumour in the neck  
? Aberrant or accessory thyroid.
- (5) Trauma
  - (a) Space between thyroid and hyoid bones, is a common site for suicidal wounds pharynx is opened vessels escape
  - (b) Stab wounds complications are out of all proportions to the external size of the wound
- (6) Acute inflammations
  - (a) Common complications of acute cervical inflammations
    - (1) Edema glottis
    - (2) Aspiration or septic pneumonia
    - (3) Mediastinitis
    - (4) Secondary hæmorrhage
  - (b) Keep tracheotomy set ready by the side of the patient at all times, in every case of acute inflammation in the neck.
- (7) Lymph glands :
  - (a) Cervical lymphadenitis, most common causes are
    - (1) Sepsis teeth tongue, tonsils, pharynx
    - (2) Tuberculosis
    - (3) Syphilis
  - (b) New growths of lymph glands
    - (1) Secondary carcinoma
    - (2) Lympho-sarcoma
  - (c) In every case of carcinomatous glands in the neck  
Find out the primary focus
    - Tongue
    - Cheek
    - Tonsils
    - Pharynx
    - Larynx
 [See under (a) also]
  - (d) Malignant glands without primary focus
    - ? Pyriform fossa
    - ? Involution of primary focus

## (e) Supra-clavicular adenopathy :

- Examine (1) Thyroid or oesophagus  
 (2) Breast  
 (3) Peritoneal cavity  
 (4) Testis

## (f) Whenever there is no obvious primary focus in a case of malignant cervical glands

- Examine (1) Base and under-aspect of the tongue  
 (2) Pyriform fossa  
 (3) Ext. auditory meatus  
 (4) Breast  
 (5) Abdomen  
 (6) Testis

## (8) New growths

- (a) Translucent, bluish swelling in the supra-clavicular region in infants cystic hygroma  
 (b) Cystic hygroma in the neck : examine the axilla  
 (c) Any unexplained tumour in the neck  
     ? Gumma  
     ? Aberrant or accessory thyroid  
 (d) Never diagnose branchiogenetic carcinoma, until you are quite sure that there is no primary focus elsewhere  
 (e) Most common malignant growth in the neck  
     Secondary glandular carcinoma

## (9) Deformity torticollis

In every case of torticollis, an X Ray plate of the cervical region should be taken before operation, to find out

- (a) Cause of the deformity  
 (b) Sequelæ of the deformity

## (10) Cervical rib

Division of scalenus anterior tendon or Adson's operation is an operation of choice in all cases of cervical rib and relieves the pressure more effectively than excision of the rib itself

## (11) Cervical operations

- (a) No operation on the neck should be performed in the presence of oral sepsis  
 (b) As far as possible, avoid opening the oral cavity pharyngeal cavity respiratory passage and alimentary passage into the cellular tissues of the neck  
     If unavoidable  
     (a) Do the operation in two stages  
     (b) Provide ample drainage

- (c) Local or regional infiltration, alone or combined with light general anaesthesia, is ideal for neck operations
  - (d) Avoid adrenaline for local infiltration in cases of toxic goitre
  - (e) Collar incisions are best in neck
  - (f) Control of bleeding from the large veins of the neck  
Ask the patient to take deep inspirations.
  - (g) Keep saline bowl always at hand flood the wound with saline in case of trauma to big veins in the lower neck, to avoid air embolism.
  - (h) Never cut anything under tension never cut without clamping on both sides always look out for muscle contractions before cutting a suspicious tissue.
  - (i) Do not leave the artery forceps on veins tie the veins immediately especially their origins from internal jugular or subclavian otherwise they may lead to either tearing or thrombosis of the parent vein.
  - (j) Be careful when cutting anything near the thoracic inlet. Troublesome hæmorrhage may follow due to retraction of the tissues cut.
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## CHAPTER V

# THE THORACIC WALL

### (I) TRAUMA OF THE CHEST WALL:

#### (A) NON PENETRATING INJURIES OF THE CHEST

##### (1) SUBPERIOSTEAL CONTUSION OR HÆMATOMA

Etiol Blows and falls

Clinic Painful tender fixed lump after trauma

Diff. diag (a) Fracture rib → callus  
(b) Periostitis  
(c) New growth

Compl (1) Infection  
(2) Ossification  
(3) Periosteal adhesions : intercostal neuralgia

Treat Conservative

##### (2) FRACTURE RIB

###### (A) Indirect

Cause Antero-posterior compression

Path Outward displacement

Site Angles of 5th to 8th ribs

Clinic (1) Local pain on deep inspiration  
(2) Local pain on antero-posterior compression  
(3) Tenderness  
(4) Crepitus  
(5) Mobility on pressure over the rib

Treat Adhesive strapping for three weeks

(a) In full expiration  
(b) Beyond the midline anteriorly and posteriorly  
(c) Each strap overlapping the other below

###### (B) Direct

Cause Local blows and falls

Path Inward displacement

Site At the site of the injury

Clinic (1) As in (A)  
+ (2) Local contusion  
(3) Local depression

Compl. (1) Injury to the viscera  
(a) Pleura hæemothorax  
(b) Lung laceration





**(B) PENETRATING INJURIES OF THE CHEST**

**Etio** Stab wounds gunshot wounds broken needle

**Clinic** (a) Shock  
 (b) Wound of entry  
 (c) Hæmorrhage  
     (a) External  
     (β) Hæmothorax  
     (γ) Hæmoptysis  
 (d) Pneumothorax with or without lung co

**Compl** (1) Surgical emphysema  
 (2) Pneumothorax (a) Open  
                       (b) Valvular

**(A) Traumatic pneumothorax**

**Etio** Stab wounds

**Clinic** Increasing dyspnoea and cyanosis  
 Absent breath sounds  
 Hyper resonance  
 Cardiac displacement

**Treat** Aspiration

**Site** Second inter-costal space  
 Two inches from sternum

**(B) Valvular pneumothorax**

**Etio** Laceration of the lung

**Clinic** Progressive and extreme signs of  
 pneumothorax with pressure on  
 neighbouring organs

**Treat** Inter-costal suction drainage by a  
 catheter

**(3) Hæmothorax**

**Treat** (1) Aspiration  
 (2) Thoracotomy } + Blood trans.

**(4) Trauma to the lung****(5) Infection empyema or pneumonia**

**(6) Trauma to** (a) Heart and pericardium  
                   (β) Upper abdominal organs

**Treat** (1) First aid air-tight closure of the wound  
 (2) Anti-shock treatment and exploration  
 (3) Debridement and exploration  
 (4) Suture of the rent in seriatim  
 (5) Closure without drainage

**After treat** (1) Anti pneumonic prophylactic  
 (2) Look for internal complications

(a) Hæmothorax  
 (b) Pneumothorax  
 (c) Pyothorax  
 (d) Pneumonia } Dyspnoea & cyanosis

**(II) INFECTION OF THE CHEST WALL:****(A) INFECTIONS OF THE SOFT TISSUES:**

**Etio** (a) Trauma abrasions  
penetrating wounds  
drainage routes

- (b) Haematoma  
(c) Suppurating axillary glands  
(d) Empyema necessitatis  
(e) Respiratory infections

**(1) ABSCESSSES OF THE CHEST WALL****(A) Sub-pectoral abscess**

**Clinic** (a) Pronounced toxæmia  
(b) Widespread abscess under pectoralis major  
(c) Prominent pectoral region  
↓ (β) Brawny induration or mass  
↓ (γ) Fluctuation  
(c) Leucocytosis

**Treat** Free incisions with adequate drainage  
(a) Along the lower border of pectoralis  
(b) Over the pointing region

**After treat** Carrel Dakin

**Compl** (1) Septicæmia  
(2) Femoral thrombo-phlebitis  
(3) Secondary hæmorrhage  
(4) Sloughing and gangrene

**(B) Subscapular abscess**

**Etio** (a) Penetrating wounds  
(b) Axillary sepsis  
(c) Osteomyelitis scapula or rib  
(d) Spinal caries

**Site** Under the scapula and scapular muscles  
↓ Subcutaneous

**Clinic** (1) Pronounced toxæmia  
(2) Prominent scapula  
(3) Fluctuating swelling  
(a) Under the scapula  
↓ (b) Subcutaneous

**(C) Secondary abscess**

- (1) Cold abscess (a) Spinal  
(b) Rib  
(c) Sternal  
(2) Empyema necessitatis  
(3) Peripleuritic abscess  
(4) Perforating lung abscess  
(5) Mediastinal infected dermoid cyst

## (2) FURUNCLES AND CARBUNCLES OF THE CHEST WALL (See under Skin)

- Site Back (a) Between and over the shoulder blades  
 (b) Nape of the neck  
 (c) Shoulder

## (3) GAS GANGRENE OF THE CHEST WALL (See under Gas Gangrene)

Etio Punctured or lacerated wounds of the muscles

- Clinic (a) Toxæmia  
 (b) Œdema, crepitus, mal-odorous discharge

Diff. diag Surgical emphysema

- Treat (a) Widespread incisions  
 (b) Oxygenating antiseptics  
 (c) Anti-gas gangrene serum

## (4) ERYSIPELAS OF THE CHEST WALL (See under Erysipelas)

## (5) CELLULITIS OF THE CHEST WALL

- Etio (1) Trauma  
 (2) Ascending extravasation of urine

## (6) SEPTIC SPREADING GANGRENE OF THE CHEST WALL

- Etio Drainage of virulent intrathoracic sepsis  
 (a) Empyema  
 (b) Lung abscess

## (7) TUBERCULOSIS

- (A) Lupus  
 (B) Cold abscess

- Etio (a) Primary  
 (a) No primary focus  
 (β) Multiple and recurrent cold abscesses in the subcutaneous tissues

## (b) Secondary

- (a) Bones (i) Sternum  
 (ii) Ribs  
 (iii) Spine  
 (β) Glands (i) Axillary  
 (ii) Mediastinal  
 (γ) Pleura or pericardium

- Path (α) Deep submuscular  
 ↓ (b) Superficial  
 ↓ (c) Bursting → sinus

- Clinic (1) Fluctuating localised, non-inflammatory swelling  
 (2) Aspiration: Caseous debris  
 (3) Primary T. B. focus

- Diff. diag (1) Chronic non tuberculous abscess  
 (2) Empyema necessitatis  
 (3) Lipoma  
 (4) Suppurating dermoid
- Compl Sinus-formation
- Treat (A) General antituberculous heliotherapy  
 (B) Local  
 (a) Carefully aseptic aspiration  
 (b) Sequestrotomy  
 (c) Excision of the underlying focus  
 (a) Bone  
 (β) Glands
- (C) Subpectoral or axillary adenitis  
 (See under Lymphatica)
- Eto (a) Local predisposition  
 (b) Spread from cervical glands  
 (c) General predisposition
- Clinic Diffuse enlargement  
 ↓ Matting  
 ↓ Caseation  
 ↓ Cold abscess formation  
 ↓ Suppuration  
 ↓ Sinus-formation
- Treat (1) General antituberculous heliotherapy  
 (2) Local (a) Scraping  
 (b) Excision

*Varieties of chest wall tuberculosis*

- (A) Pleural  
 (a) Empyema necessitatis  
 (b) Pleuro-cutaneous sinuses  
 (c) Post-operative spread
- (B) Endo-thoracic fascial  
 Site Between pleura and ribs  
 Diag X Ray after Ilioidol  
 Treat Conservative
- (C) Bony  
 (a) Ribs  
 (b) Cartilage  
 (c) Sternum  
 (d) Periosteum  
 Treat Surgical
- (D) Subcutaneous Lymph glands
- (E) Cutaneous (a) Primary lupus  
 (b) Secondary to deeper foci

(8) SYPHILIS

- (A) Chancre of the nipple or breast

(B) Secondary cutaneous eruptions

(C) Gumma

Sites (a) Skin } anywhere  
(β) Muscles }

Clinic (α) Tumour

Rubbery elastic dusky solitary

↓ (b) Abscess

Liquifaction + secondary infection

↓ (c) Ulcer Gummatous

Diff. diag (1) Malignancy

(2) Tuberculosis

Treat Anti-syphilitic

(9) ACTINOMYCOSIS

Etio Spread from (α) Jaw or neck

(b) Lung and pleura

Clinic (α) Chronicity

(b) Induration

(c) Multiple abscesses and sinuses

Diag (α) Sulphur granule discharge

(b) Ray fungus in smear

Treat (1) Massive doses of pot iodide

(2) Copper sulph. or iodine sol

(α) Irrigations

(β) Injections

(3) Operative Scraping or excision

(10) BLASTOMYCOSIS

Site Anywhere on the thorax

Path: (1) Cutaneous

(2) Pulmonary → systemic

Clinic (α) Pastules multiple, in crops

(b) Subcutaneous abscesses and sinuses

(c) Local ulcerations:

With Papillomatous fungoid granulations

Diag Blastomycetes in smear

Treat (1) Excision

or (1) Incisions and drainage

↓ (2) Copper sulph. or iodine irrigations

(3) Radiotherapy

(4) Massive doses of pot. iodide

(B) INFECTIONS OF THE CHONDRUM AND PERICHONDRUM:

(1) PYOGENIC CHONDRITIS AND PERI CHONDRITIS

Etio (α) Trauma

(b) Extension

(c) Pyæmic

- Path (a) Perichondrium stripped off  
 (b) Chondrium dark eroded necrosed
- Clinic (a) General signs of inflammation  
 (b) Local signs of inflammation  
       (a) Inflammation  
       ↓ (β) Abscess  
       ↓ (γ) Sinus  
       ↓ (δ) Extension to neighbours

## (2) TYPHOID CHONDRITIS

- Etiology (a) Men over 30  
 (b) Convalescent or delayed
- Path Osteitis near costo-chondral junction  
 ↓ Separation of cartilage  
 ↓ Suppuration
- Clinic (a) History of typhoid  
 (b) Onset insidious or acute  
 (c) Local signs  
       (a) Painful tender slow swelling  
       ↓ (β) Fluctuant abscess  
       ↓ (γ) Sinus
- Diag (a) Widal  
 (b) Smear
- Diff diag (a) Pyogenic  
 (b) Tuberculous  
 (c) Syphilitic  
 (d) New growth sarcoma

## (3) TUBERCULOUS CHONDRO PERICHONDRITIS

- Etiology (a) Systemic  
 (b) Local extension from thorax or mediastinum
- Path Origin cartilage, perichondrium, rib
- Clinic (a) Spontaneous or post traumatic insidious swelling over the costal cartilage  
 ↓ (b) Fluctuant cold abscess  
 ↓ (c) Discharging sinus
- Diff diag (1) Chronic pyogenic chondritis  
 (2) Typhoid chondritis  
 (3) Syphilitic chondritis

## (4) SYPHILITIC CHONDRITIS

- (A) Secondary osteocopic pains  
 (B) Perichondritis and chondritis:

Clinic (1) Swelling:

Spontaneous, slow fusiform.  
 Sterno-costal or costo-chondral.

- (a) Firm and elastic  
 ↓ (β) Soft and doughy  
 ↓ (γ) Fluctuant  
 ↓ (2) Abscess  
 ↓ (3) Sinus

Diag Other signs of syphilis

## (5) ACTINOMYCOTIC AND BLASTOMYCOTIC CHONDROITIS

*Treatment of perichondritis and chondritis*

- (1) Total subperichondral excision  
 From bony rib to bony sternum  
 Whole of the cartilaginous mass
- (2) General anti-treatment
  - (a) Pyogenic
  - (b) Tuberculosis
  - (c) Syphilis
  - (d) Typhoid
  - (e) Actinomycosis

## (C) INFECTIONS OF THE BONES AND PERIOSTEUM :

- Etio
  - (1) Pyogenic
  - (2) Tuberculosis
  - (3) Typhoid
  - (4) Syphilis
  - (5) Actinomycosis
  - (6) Blastomycosis

### (1) PYOGENIC PERIOSTITIS AND OSTEO MYELITIS OF THE RIBS AND STERNUM

- Etio
  - (a) Trauma
  - (b) Extension from intra-thoracic lesion
  - (c) Septicæmic
- Path Extension along the rib or sternum
- Clinic
  - (a) Swelling painful and tender
  - ↓ (b) Abscess
  - ↓ (c) Sinus
  - (d) X Rays
- Treat
  - (1) Acute stage incision and drainage
  - (2) Chronic stage resection
- Compl
  - (1) Abscess
    - (a) Subcutaneous
    - (b) Extrapleural
    - (c) Mediastinal
  - (2) Necrosis rib
  - (3) Anterior mediastinitis
  - (4) Pneumonia



## (2) TYPHOID PERIOSTITIS AND OSTEOMYELITIS

Etiology Convalescent or delayed

Pathology Periostitis  
Osteoperiostitis  
Osteomyelitis  
Bone abscess

Clinic (1) Pain  
↓ (2) Slow small swelling of a rib  
↓ (3) Cold abscess  
↓ (4) Sinus  
(5) History + bradycardia + widal

Course (1) Acute  
(2) Chronic  
(3) Recurrent

Treat (1) General Typhoid vaccine  
(2) Surgical (a) Curettage and drainage  
(b) Sub-periosteal resection

## (3) TUBERCULOSIS OF RIB AND STERNUM

Etiology Young and middle age

Pathology (1) Primary (a) Periostitis  
(b) Osteomyelitis  
(2) Secondary to intra thoracic tuberculosis

Clinic (1) Osteo-sclerosis  
↓ (2) Cold abscess (a) Local  
(b) Gravitating  
↓ (3) Secondary infection: signs of inflammation  
↓ (4) Sinus  
+ (5) X Rays

Diff. diag: (1) Chronic non tuberculous osteomyelitis  
(2) Typhoid rib  
(3) Syphilis

(4) Lipoma from cold abscess  
Treat (1) General: anti tuberculous  
(2) Local (a) Repeated aspirations  
(b) Resection

## (4) SYPHILIS

Pathology (1) Osteocopic pains  
(2) Periostitis  
(3) Osteitis and osteo-periostitis  
(4) Gummatous osteomyelitis

Clinic (1) Spindle-shaped swelling of a rib  
or Globular swelling of sternum  
sterno-clavicle  
(a) Elastic and doughy  
↓ (b) Soft and fluctuant

- ↓ (2) Secondarily infected inflammatory abscess
- ↓ (3) Sinus or ulcer
- + (4) X Rays
- + (5) Other syphilitic stigmata
- Treat (1) Anti syphilitic
- (2) Operative
  - Ind (a) Extensive necrosis
  - (b) Secondary infection
  - Tech (a) Incision and drainage
  - (b) Scraping and sequestrotomy
  - (c) Resection

### (5) ACTINOMYCOSIS AND BLASTOMYCOSIS OF RIB AND STERNUM

- Path (a) Periostitis
- (b) Osteomyelitis
- Clinic (See above under soft part infections)
- Treat (1) Massive dosage of pot. iodide
- (2) Curettage or excision
- (6) XYPHOIDITIS
- Path Chronic periostitis
- Clinic Pain and tenderness
- Treat Excision

## (III) RICKETS OF THE CHEST WALL

- (1) **Rickety rosary**  
Beaded enlargement of costo-chondral junctions
- (2) **Pigeon breast**  
Effect of impeded respiration on thoracic soft bones
- (3) **Harrison's sulcus**  
Traction of the diaphragm on soft ribs

## (IV) NEW GROWTHS OF THE CHEST WALL

### (A) TUMOURS OF THE SOFT TISSUES

- (1) **Sebaceous cyst**
- (2) **Dermoid cyst** Mid line anterior
- (3) **Fibroma**
  - (a) Keloid
  - (b) Subcutaneous fibroma
  - (c) Neuro-fibroma
    - (a) Single
    - (b) Multiple
    - (r) Molluscum fibrosum
    - (s) Plexiform neuro-fibroma
- (4) **Lipoma**
  - Site Back, shoulder axilla, retromammary
  - Compl Penetration of thoracic wall
- (5) **Melanoma** Pigmented moles

- (6) **Lymphangloma** Superficial or sub-muscular
- (7) **Hæmangloma** Cavernous telangiectatic
- (8) **Carcinoma** Secondary to breast
  - (a) Cancerous pachydermia
  - (b) Cancer en cuirasse
  - (c) Cancerous nodules
  - (d) Paget's disease
- (9) **Sarcoma**
  - (a) Secondary to breast or bone or Cartilage
  - (b) Primary in fasciæ or muscles

## (B) TUMOURS OF THE RIB AND STERNUM

### (1) **Sarcoma**

Etio. 60%

Path. **Chondro-osteosarcoma**: spindle-round-mixed celled

### (2) **Carcinoma**:

- (a) Infiltrative from breast
- (b) Metastatic

### (3) **Chondroma** 15%

### (4) **Osteoma**

Etio. 2nd to 6th decade

- Clinic (1) Pain (a) Local  
(b) Neuralgic  
(2) Swelling attached to a bone  
(3) Skin implication  
(4) X Rays

Diff diag. *Of chest wall tumours*

- (A) Bone Chronic inflammation
  - (a) Pyogenic
  - (b) Tuberculous
  - (c) Syphilitic
  - (d) Typhoid
- (B) Aneurysm
- (C) Intra-thoracic tumours extending outside
- (D) Dermoid cyst

Treat. Radical excision

Ind. Primary tumour without

- (a) Metastases
- (b) Cachexia

Anæsth. (1) Intra-tracheal positive-pressure  
(2) Local

Tech. Incision

↓ Excision of tumour with wide margin

↓ Air-tight closure

By Muscle, mobilised breast  
diaphragm, fascia lata

Post. compl. (a) Surgical pneumothorax  
(b) Sepsis  
(c) Pleural effusion → empyema

**(V) DEFORMITIES OF THE CHEST WALL****(1) NORMAL VARIATIONS**

- (a) **Narrow alar chest**
- (b) **Flat chest**

**(2) CONGENITAL Local prominence of sternum rib****(3) RICKETY DEFORMITIES**

- (a) **Pigeon chest**
- (b) **Rickety rosary**
- (c) **Harrison's sulcus**

**(4) ATTITUDINAL DEFORMITIES****Crumpled chest**

Etio Faulty attitudes + rickets

**(5) SECONDARY DEFORMITIES**

Etio Intra-thoracic cause

Varieties (a) **Barrel shaped chest**

Etio Pulmonary emphysema

(b) **Unilateral enlargement**

Etio (1) Pleuritic effusion

Gas, serum blood pus

(2) Intra thoracic tumour

(c) **Unilateral shrinking**

Etio (1) Old pleuritic adhesions

(2) Fibrosis of the lung

**(6) SPINAL THORAX**

Thoracic deformity secondary to that of spine

**(VI) OPERATIONS ON THE CHEST WALL****RESECTION RIB**

Ind (1) **Empyema**

(2) **Carries rib**

(a) **Pyococcal**

(b) **Tuberculosis**

(c) **Typhoid**

(d) **Syphilis**

(e) **Actinomycosis**

(f) **Empyema drainage**

(3) **Tumours of the rib**

(a) **Chondroma**

(b) **Osteo-chondroma**

(c) **Osteo-chondro-sarcoma**

(4) **Access to internal viscera · Empyema**

(5) **Wounds of intercostal or int. mammary artery**

Tech (1) **Anaesthesia**

(a) **Local infiltration**

(b) **Regional** Nerve block  
Paravertebral

(c) **General**

(2) **Incision**

(a) Over and parallel to the rib

or (b) Right angles to the rib

If many ribs are to be removed

(3) **Periosteal incision**

(4) **Stripping off the periosteum and intercostal bundle from the rib**

(Doyen's respiratory)

(5) **Excision of the required portion of the rib**  
(Rib shears)

**Points** (1) **Avoid inj. to intercostal vessel and nerve**

(2) **Avoid injury to the underlying pleura**

(3) **Do not leave projecting spicules of bone**

(For other operations on thoracic wall see under Respiratory System)

## (VII) IMPORTANT POINTS

### (A) Trauma of the chest wall

(1) **Continuously painful tender immobile swelling over a rib after direct trauma, with no effect on symptoms, of respiratory movements**

? Subperiosteal contusion or haematoma.

(2) **Bony swelling with a history of old trauma**

? Ossified sub-periosteal haematoma

? Callus

? Infection T B syphilis

? Sarcoma.

(3) **Direct fracture of the rib is more dangerous than indirect fracture.**

(4) **Adhesive strapping in expiration is indicated only in indirect fracture and is contra-indicated in direct fracture with inward displacement**

(5) **Dyspnoea and cyanosis after a chest wound**

? Traumatic pneumonia

? Pleural effusion serum blood pus

? Pneumothorax.

(6) **Do not omit prophylactic anti pneumonic treatment in every case of chest injury**

(7) **Chest injuries must be divided into those with**

(a) **Pneumothorax** (a) Closed

(β) Open

(b) **No pneumothorax.**

(8) **First cardinal rule in the treatment of chest injuries is to close any sucking wound of the chest wall immediately**

- (9) **Bellman's principles in chest injuries treatment**  
 (a) Immediately close all sucking wounds  
 (b) Closed pneumothorax with dyspnoea  
     Aspirate the air  
 (c) Haemorrhage from intercostal arteries  
     Encircle the entire rib above and below with a  
     tight suture  
 (d) Large lacerations of the lung should be repaired.
- (10) Open wounds of the thorax can be divided into two  
 great classes (a) Sucking do urgent closure  
 (b) Non-sucking

**(B) Infections of the chest wall**

- (1) **Tissues to be infected**  
 (a) Soft tissues  
 (b) Chondrium and perichondrium  
 (c) Bone and periosteum
- (2) **Infections of the chest wall**  
 (a) Pyogenic (a) acute  
                   (b) chronic  
 (b) Tuberculosis  
 (c) Syphilis  
 (d) Typhoid  
 (e) Actinomycosis and blastomycosis  
 (f) Others (a) Gas gangrene  
                   (b) Erysipelas  
                   (c) Cellulitis  
                   (d) Septic gangrene
- (3) **Clinical stages of the chest wall infections**  
 (a) Pain and tenderness  
 ↓ (b) Swelling (a) Hard bone or cartilage  
                   (b) Soft soft tissues  
 ↓ (c) Cold abscess non-inflammatory  
 ↓ (d) Subacute or acute abscess  
 ↓ (e) Sinus
- (4) **Additional examination in the chest wall infections**  
 ? Tuberculous diathesis or focus elsewhere  
 ? Syphilitic history or stigmata  
 ? Typhoid history
- (5) **Common infections observed elsewhere are but rarely  
 observed in the soft parts of the thoracic wall due to  
 absence of exposure and trauma.**
- (6) **Cold abscess in the thoracic wall**  
 ? Rib or cartilage  
 ? Sternum  
 ? Spine  
 ? Scapula  
 ? Lymph glands  
 ? Empyema necessitatis

- (7) Typhoid is the commonest of the haematogenous forms of infection involving the costal cartilages and the ribs.
- (8) Always suspect tuberculosis, when a chronic inflammatory lesion appears spontaneously over a costal cartilage or rib.
- (9) Procedures adequate for localised infections in the bone do not suffice for chondritis. Incision and scraping of the chondrium is followed by extension of the disease. Radical excision is the only effective treatment of chondral infections. Care must be taken to excise the whole mass of cartilage from bone to bone and to leave no portion of cartilage behind.
- (10) Tuberculosis of the chest wall
  - (1) Pleural tuberculosis
  - (2) Endothoracic fascial tuberculosis
  - (3) Bony tuberculosis
    - (a) Rib
    - (b) Cartilage
    - (c) Sternum
    - (d) Periosteum
    - (e) Spine

#### (C) New growths of the chest wall

- (1) Lipoma melanoma and carcinoma are the commonest tumours of the soft tissues of the thoracic wall
- (2) Sarcoma is the commonest tumour of the bony thorax next is chondroma, followed by secondary carcinoma.
- (3) Growths of the chest wall can be differentiated into
  - (a) Innocent lipoma, neuro-fibroma
  - (b) Innocent  $\rightarrow$  malignant  
Chondroma, melanoma
  - (c) Malignant sarcoma, carcinoma
- (4) Carcinoma is the commonest tumour of the chest wall to be met with as carcinoma of the breast is very common.
- (5) Greatest number of metastatic tumours in bony thorax are due to breast carcinoma.
- (6) Neoplasm of the rib or sternum in a patient with syphilis may decrease in size after antisyphilitic treatment.

#### (D) Rib operation: excision

- (1) Beware of premature or unnecessary injury to the pleura.
- (2) Too long a drainage by rubber tube leads to necrosis of a rib.

- (3) Spreading gangrene of the thoracic wall is sometimes a complication of the drainage of a virulent intra thoracic sepsis.
- (4) Air-tight closure of the thoracic wound is a matter of first importance in cases in which the pleura has been opened.
- (5) Anti pneumonic prophylaxis is of paramount importance in every case of trauma to or operation on the thorax.

## (E) Differential diagnosis of chest wall affections

### (a) Pain & tenderness

- (1) Soft tissue inflammations
- (2) Muscular
 

(a) Myalgia	}	rheumatic
(β) Pleurodynia		
(γ) Stitch overstrain		
- (3) Nervous
 

(a) Neuralgia	intercostal
(β) Herpes	zoster
(γ) Secondary	spinal disease or trauma aneurysm new growth pressure
- (4) Bony affections
 

(a) Trauma	contusion fracture
(β) Inflammations	
(γ) New growths	
- (5) Visceral pleurisy
 

heart disease	angina
flatulence	

### (b) Swelling

- (1) Skin and subcutaneous tissues
 

(a) Trauma	contusion, hæmatoma
(β) Inflammations	acute abscess spreading cellulitis cold abscess gumma actinomycosis
(γ) New growths	lipoma fibroma, neuro-fibroma carcinoma, sarcoma
- (2) Bones and cartilages
 

(a) Trauma	contusion fracture callus
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- (β) Inflammations
    - pyogenic
    - tuberculous
    - typhoid
    - syphills
    - actinomycosis
  - (γ) New growths
    - chondroma
    - osteoma
    - sarcoma
    - secondary carcinoma
  - (δ) Metabolic
    - rickety rosary
  - (3) Secondary to visceral affections
    - (α) Intra-thoracic effusions
    - (β) Enlarged liver
    - (γ) Aneurysm
    - (δ) Intra thoracic tumours
  - (4) Secondary to deformity
    - (α) Congenital prominence
    - (β) Rickety chest
    - (γ) Spinal chest.
-

## CHAPTER VI

# THE BREAST

### (A) AFFECTIONS OF THE NIPPLE:

#### (1) CONGENITAL AFFECTIONS OF THE NIPPLE

(A) Absence of the nipple

(B) Supernumerary nipples

Etio Males

Site Axilla → groin

(C) Retraction of the nipple : Incomplete evolution

#### (2) RETRACTION OF THE NIPPLE

Etio (a) Congenital

(b) Fibrosis Post-inflammatory malignancy

(c) Infiltration Malignancy

Compl Milk congestion

↓ Acute mastitis

↓ Mammary abscess

#### (3) CRACKS OF THE NIPPLE

Etio Neglect in pregnancy and lactation

Clinic (a) Intense pain and burning

(b) Serous discharge

Compl (a) Mastitis

(a) Streptococcal cellulitis

(β) Ductal

(b) Axillary adenitis

Treat: (a) Prophylactic : Hardening with spirit

(b) Curative

(a) Dressings dry silver nitrate

(β) Artificial emptying of the breast

#### (4) CHANCRE OF THE NIPPLE

Etio (a) Suckling child

Colles's law wet nurse not mother

(b) Opposite sex

Clinic (a) Local Indolent (a) Fissure

(β) Induration

(γ) Ulcer

(b) Regional Hard and shotty axillary glands

(c) General Secondary rash

Other syphilitic stigmata

## (5) ECZEMA OF THE NIPPLES

- Etio Moisture  
 Clinic (a) Bilateral  
          (b) Lactational  
          (c) Amenable to treatment  
 Diff. diag (1) Crack  
              (2) Chancre  
              (3) Paget's disease  
 Compl (a) Cracks  
          (b) Lymphangitis → lymphadenitis  
          (c) Mastitis → mammary abscess  
 Treat (1) Local ointments, antiviral applications  
          (2) General vaccine

## (6) PAGET'S DISEASE OF THE NIPPLE

Def Unilateral, chronic, intractable, eczema-like affection which co-exists with or is followed by carcinoma breast

- Path (A) Theories  
       (1) Handley's post-cancer theory  
           Lymphatic obstruction  
       (2) Cheate's cancer theory  
           Carcinoma of duct outlet  
       (3) Turnbull's cancer theory  
           Basal-celled skin carcinoma  
       (4) Muir's precancer theory:  
           Intra-ductal epithelial proliferation

- (B) Morb. anat  
       (1) Proliferation of the epidermis  
       (2) Paget's cells large and clear  
       (3) Lymphocytes and plasma cells  
       (4) Epithelial hyperplasia in the breast

- Clinic (a) Florid red eruption  
       ↓ (b) Moist chronic eczema  
       ↓ (c) Dry psoriasis-like patches  
       with (a) Sharply defined margins  
           + (β) Papyraceous induration  
           + (γ) Eroded nipple

- Diagnosis (1) Menopause  
           (2) Unilateral  
           (3) Intractable  
           (4) Associated carcinoma breast

- Diff. diag: (a) Cracks  
              (b) Eczema  
              (c) Chancre

Treat Radical removal of the breast as soon as diagnosis is established

## (7) NEW GROWTHS OF THE NIPPLE

## (A) Papilloma

Clinic Pedunculated globular warty

Compl Ulceration

Treat Excision

## (B) Carcinoma

- Varieties (1) Squamous skin  
 (2) Spheroidal sebaceous  
 (3) ? Basal-celled Paget's disease

## (8) ABNORMAL NIPPLE DISCHARGES

## Varieties (A) Milky

- (a) Latent lactation  
 (b) Galactoceles

## (B) Purulent

- (a) Acute mammary abscess  
 (b) Chronic mammary abscess

## (C) Serous or sero-sanguinous

- (1) Chronic interstitial mastitis  
 (2) Chronic duct catarrh  
 (3) Duct papilloma  
 (4) Duct carcinoma

## (D) Blood

- (1) Duct papilloma  
 (2) Duct carcinoma  
 (3) Chronic duct catarrh

## (E) Green

- (1) Chronic duct catarrh  
 (2) Chronic interstitial mastitis with polycystoma

## Treat

- (A) Discharging nipple without a palpable mass  
 Local excision of the ducts  
 (B) Discharging nipple with a suspicious mass  
 (a) Amputation of the breast  
 ↓ (b) Biopsy  
 (C) Discharging nipple with carcinomatous mass  
 Radical removal

## (9) MONTGOMERY'S CYST Areolar sebaceous cyst

## (B) AFFECTIONS OF THE BREAST

## (1) CONGENITAL BREAST ABNORMALITIES:

## (1) AMAZIA OR AMASTIA

Def Absence of the breast

Associated	Absence of sternal part of pectoralis
(2)	<b>POLYMAZIA OR POLYMASTIA</b>
Def	Accessory breasts
Clinic	Additional breast lying in line from axilla to umbilicus, groin or thigh
(3)	<b>GYNÆCOMAZIA OR GYNÆCOMASTIA</b>
Def	Male breast resembling that of virgin female
Etio	Adolescence
Path	(a) Development of ducts and supporting tissue (b) Pseudo-lactation in rare cases
Clinic	Female configuration of a male breast
Compl	(a) Psychic effect (b) Mastitis
Treat	Excision with preservation of areola and nipple

## (II) INJURIES OF THE BREAST :

(1)	<b>CONTUSION AND HÆMATOMA</b>
Etio	Direct injury operative trauma
Clinic	(1) Lump with or without overlying contusion (2) History of injury or recent operation
Compl	(a) Sepsis (b) Fat necrosis (c) Malignancy
(2)	<b>MILK FISTULA</b>
Etio	Penetrating wound } across a milk duct Operative incision }
(3)	<b>TRAUMATIC FAT NECROSIS</b>
Etio	History of contusion or hæmatoma in stout breast
Path	Slow aseptic saponification of neutral fat Morb. anat Chalky white areas Microscope Necrotic fat Vacuolated cells Giant cells
Clinic	(1) History of previous injury (2) Lump Painless, hard well-defined adherent (3) Retraction of nipple in 20% (4) Peau d orange sometimes
Diag	Persistent adherent lump following trauma in a stout middle-aged female
Diff diag	(1) Hæmatoma (2) Carcinoma (3) Tubercle or gumma (4) Any other tumour
Treat	Local excision → biopsy

**(III) INFLAMMATIONS OF THE BREAST:****(1) MASTITIS NEONATORUM**

- Etio** (a) Hormonic maternal  
 (b) Retrograde bacterial infection of the ducts
- Clinic** Mastitis within a few days of birth
- Treat** Expectant and non interfering

**(2) MASTITIS ADOLESCENTUM**

- Clinic** Unilateral mastitis in a boy about 14
- Treat** Expectant  
 (a) Shing  
 (b) Scott's ointment  
 (c) Mist. pot. iodide

**(3) MASTITIS OF LACTATION**

- Etio** (a) Child birth with inability to suckle  
 due to (a) Maternal defect  
 (β) Child defect  
 (b) Portal of sepsis entry cracks of the nipple
- Path** (A) **Ductal mastitis Obstruction mastitis**  
 (a) Ductal obstruction  
 ↓ (b) Milk engorgement  
 ↓ (c) Staphylococcal mastitis
- (B) **Lymphangitic mastitis Abrasion mastitis**  
 (a) Cracks of the nipple  
 ↓ (b) Lymphangitis  
 ↓ (c) Streptococcal mastitis
- Clinic** (1) **Stage of engorgement or lymphangitis**  
 (A) **Local**  
 (a) Engorgement  
 (a) Some cause of milk retention  
 (β) Acute engorgement of breast with cord-like ducts converging on the nipple  
 (b) Lymphangitis  
 (a) Cracks of the nipple  
 (β) Superficial inflammation with red streaks
- (B) **Regional**  
 Tender enlargement of axillary glands
- (C) **General toxæmia**
- (2) **Stage of acute mastitis**  
 (a) Acutely inflamed breast with spreading oedema and induration  
 (b) Acute axillary lymphadenitis  
 (c) Acute general toxæmia
- Diff. diag** Mastitis carcinomatosa

- Compl (1) Acute subacute or chronic breast abscess  
(2) Subacute or chronic mastitis

Treat (A) **Preventive**

(a) **Before lactation**

**Preparation of the nipple**

- (a) Mechanical prominence  
(β) Hardening spirit  
(γ) Care of abrasions

(b) **Lactation**

- (a) Asepsis of the nipple: Dry cleaning  
(β) Asepsis of the child's mouth

(c) **Weaning**

**Treatment of milk engorgement:**

- (1) Judicious breast pump  
(2) Glycerine-belladonna  
(3) Sling  
(4) Dehydration saline purges  
(5) Atropine and pot. iodide

(B) **Curative**

- (1) Treatment of milk engorgement  
(2) Bier's hyperæmia  
By suction pump for 45 min. daily  
(3) Sulphonamide therapy  
(4) Vaccines

(4) **SUBACUTE OR CHRONIC REGIONAL MASTITIS**

Etio (a) **Local irritation** Ill-adjusted braces

(b) **Secondary to acute mastitis**

- (a) Infantile  
(β) Adolescent  
(γ) Lactational

(c) **Specific T B syphilis**

- Clinic (1) Subacute or chronic, tender induration which neither liquifies nor resolves  
(2) Axillary lymphadenitis  
(3) Mild general toxæmia

- Diff. diag (1) **Hæmatoma**  
(2) **Fat necrosis**  
(3) **Carcinoma**  
(4) **Chronic abscess**  
(5) **Chronic interstitial mastitis**  
(6) **Fibro-adenoma**  
(7) **Specific diseases T B. gumma**

Compl **Breast abscess**

Treat (1) **Local**

- (a) Counter irritants Scott's ointment
- (b) Heat & Bier's hyperæmia
- (c) Multiple needlings
- ↓ Fomentations and Bier's hyperæmia

(2) **General**

- (a) Sulphonamide therapy
- (b) Vaccines
- (c) Pot. iodide fibrolysin

(5) **ACUTE ABSCESS OF THE BREAST**(1) **Intra mammary abscess**

- Etiol (a) Milk obstruction Obstruction mastitis  
 (b) Nipple abrasions Abrasion mastitis

- Path (a) Continuation of acute lactational mastitis  
 ↓ (b) Localising abscess in the mammary tissue  
 ↓ (c) Bursting  
 ↓ (d) Sinuses

Clinic (A) **Local**

- (1) Continuation of acute lactational mastitis
- ↓ (2) Localised induration Inflammatory  
Painful tender oedematous red
- ↓ (3) Localised fluctuation Inflammatory
- ↓ (4) Pointing of the abscess
- ↓ (5) Bursting
- ↓ (6) Sinus

(B) **Regional**

Axillary lymphadenitis

(C) **General**

Hectic high temperature

(D) **Special**

Leucocytosis

Diff. diag **Mastitis Carcinomatosa**

Compl **Milk fistula**

Treat (1) **Aspiration** Under local anaesthesia  
 (Med. Ann. 1937)

↓ Dakin's lavage

- Ind (a) Abscess in a non-lactating breast
- (b) Localised unifollicular abscess

(2) **Incision and drainage**

Tech (A) **Local method**

(a) **Incision**

Radiating from the nipple  
 Over the most prominent part

↓ (b) **Breaking down all septa**



- ↓ (c) Counter incision  
Over the dependant part
- ↓ (d) Drainage

**(B) Sheld's method**

- (a) Infra mammary drainage
- + (b) Suture of upper incision

**(C) Bailey method**

- (a) Small incision  $\frac{1}{2}$  inch
- + (b) Closed drainage

**Post. treat (A) Local**

- (1) Open drainage method
- or (2) Closed drainage method (Bailey & Love)
- with (a) Dakin's irrigations
- (b) Vaseline or oily skin dressings

**(B) Regional**

- (3) Treatment of milk engorgement  
Breast pump
- (4) Supporting bandage and arm sling

**(C) General** Sulphonamide group  
Vaccines**(II) Supra mammary or sub-areolar abscess****Etio** Skin lesion**Clinic** Subcutaneous abscess**Treat** Incision and drainage local radiating**(III) Sub-mammary abscess****Etio** (1) Muscle lesions

Deep intra muscular } abscess  
Sub-muscular glandular }

(2) Bone lesions osteomyelitis ribs

(3) Thorax lesions empyema necessitatis

**Clinic** (1) Unilateral prominence of the breast as a whole

(2) Fluctuating swelling

(a) Behind the breast

(b) Felt at its margins

(3) Presence or absence of acute inflammation

**Compl** Chronic sinus**Treat** (1) Incision and drainage

Site Infra-mammary sulcus

Lower and outer quadrant

↓ (2) Treatment of underlying etiology

**(6) CHRONIC STAPHYLOCOCCIC ABSCESS****Etio** Infection by mild staphylococci

Path: Encysted chronic, localised, staphylococcal abscess

Clinic (a) Local hard, non-inflammatory swelling  
(b) Enlargement of axillary glands  
(c) Peau d orange sometimes

Diag Tenderness of the mass and glands

Diff. diag (a) Carcinoma  
(b) Gumma  
(c) Tuberculosis  
(d) Fat necrosis  
(e) Localised chronic mastitis

Treat (1) Local  
(a) Aspiration Repeated if necessary  
(b) Incision and drainage  
(c) Exploration and excision in toto  
(2) General  
(a) Vaccines  
(b) Stanno-manganese  
(c) Sulphonamide therapy

#### (IV) SPECIFIC DISEASES OF THE BREAST

##### (1) TUBERCULOSIS OF THE BREAST

Eti Age 25 → 35

Varieties (1) Primary  
(2) Secondary To neighbouring foci  
(a) Axillary glands  
(b) Bones  
(c) T. B. empyema

Path (a) Paths of infection  
(1) Ducts  
(2) Surface wounds  
(3) Blood stream  
(4) Lymphatics cervical glands  
↓ axillary glands  
↓ breast  
(5) Contiguity of structures

Clinic

(A) Primary breast tuberculosis

Varieties (1) Nodular  
(a) Irregular lumps  
↓ (b) Central caseations  
↓ (c) Tuberculous sinuses  
(2) Sclerosing  
Hard shrunken, adherent mass with  
(a) Nipple retraction  
(b) Peau d orange

(3) **Confluent :**

(a) Soft, boggy mass

↓ (b) Ulceration

- Diagnosis**
- (1) Tender indurations One or more
  - (2) Fibrosis Retraction of nipple, adhesions
  - (3) Lymph stasis Pear d orange
  - (4) Cold abscesses
  - (5) Sinuses With pale granulations
  - (6) Enlargement of axillary glands

**Diff. diag** Of any chronic lump in breast

- (1) Fat necrosis
- (2) Chronic abscess
- (3) Gumma
- (4) Carcinoma
- (5) Chronic mastitis

(B) **Secondary breast tuberculosis**↓ **Retromammary cold abscess :** Due to

- (a) Ribs
- (b) Sternum
- (c) Spine
- (d) Thorax tuberculous empyema
- (e) Axillary glands

**Compl** (Of T. B. breast)

- (1) Phthisis
- (2) Lardaceous disease

**Treat** (1) Conservative

- (a) General anti tuberculous
- (b) Local counter irritants  
Bler  
rest

(2) Operative

- (a) Aspiration of cold abscess
- (b) Scraping
- (c) Excision
- (d) Partial resection of breast
- (e) Amputation breast

(2) **SYPHILIS OF THE BREAST**(A) **Chancres of the nipple** (See under Nipple)(B) **Gumma of the breast**

**Clinic** (1) Tumour

Painless, palpable, hard movable but fixed in the breast tissue

(a) Deep

↓ (b) Adherent to the skin which is :

(α) Normal

or (β) Pear d orange

- ↓ (2) **Liquifaction and softening**  
 ↓ (3) **Abscess formation secondary infection**  
 ↓ (4) **Gummatous ulcer**  
**Diff. diag** Other chronic affections of the breast  
**Treat** (1) Pot. iodide  
 (2) Anti-syphilitic

(C) **Secondary syphilis of the breast**

- (a) Mucous patches in submammary folds  
 (b) Diffuse bilateral mastitis

(3) **ACTINOMYCOSIS OF THE BREAST**

- Clinic** (a) Multiple indurations  
 ↓ (b) Softenings  
 ↓ (c) Sinuses with sulphur granule discharge  
**Treat** (See under Actinomycosis)

(4) **ELEPHANTIASIS OF THE BREAST**

- Clinic** (1) Enormous and uniform swelling of the skin  
 and subcutaneous tissues with  
 (a) Peau d orange  
 (b) Lymphorrhoea  
 (2) Recurrent attacks of streptococcal lymphangitis  
 (3) Recurrent lymphatic fever  
**Diff. diag** Malignancy  
**Treat** Amputation breast

(V) **CHRONIC HYPERPLASIAS OF THE BREAST:**

(1) **MEGALOMAZIA OR MEGALOMASTIA**

- Def** Bilateral diffuse hypertrophy of the breasts  
**Etio** (a) Adolescence  
 (b) Pregnancy  
 (c) Lactation  
**Path** Pituitary or ovarian dysfunction (?)  
 ↓ Diffuse fibrous hypertrophy  
**Clinic** (a) Enormous enlargement of both breasts  
 ↓ (a) Weight  
 (β) Pressure  
 (γ) Deformity  
 (b) Association with  
 (a) Amenorrhoea  
 (β) Reproductive anomalies  
**Treat** Amputation of the breasts

(2) **CHRONIC INTERSTITIAL MASTITIS**

- Synonyms** *Maladie kystique of Schimmelbusch*  
*Alasoplasia of Cheate*

- Def** A morbid deviation from the normal physiological processes of evolution and involution which correspond with the sexual crises, diffuse fibrosis and epithelial

- Etiology:** (a) Unmarried  
 (b) Childless  
 (c) Menopause
- Pathology:** (1) *Theories*  
 (A) Perversion of physiological stimulus  
       Ovaries and corpus luteum  
 (B) Chronic irritation ← Retained secretion  
 (C) Persistent lymph oedema  
       Sampson Handley
- (2) *Morb changes*  
 (A) Peri-acinar and periductal fibrosis  
 (B) Acinar and ductal epithelial proliferation  
       (a) Desquamative chronic duct catarrh  
       (β) Intra-ductal papillomata  
       (γ) Solid epithelial hyperplasia  
 (C) Acinar and ductal cystic dilatation
- (3) *Varieties*  
 (A) Hypertrophic Cellular + epithelial  
 (B) Atrophic Fibrotic  
 (C) Cystic  
 (1) Local Secondary to duct obstruction  
       due to  
               (a) Duct papilloma  
               (b) Duct carcinoma  
               (c) Fibro-adenoma  
               (d) Fibrosis
- (2) Diffuse
- Clinical:** (1) Local  
 (a) Mastodynia  
 (b) Serous discharge from the nipple  
 (c) Granular induration:  
       (a) Sector-shaped  
       (β) Diffuse  
       (γ) Multiple (each sector-shaped)  
       (δ) Felt laterally but not against the  
           thoracic wall  
 (d) Cyst or cysts  
 (e) Absence of fibrous contractions:  
       (a) Deviations  
       (β) Retractions  
       (γ) Adhesions
- (2) Regional  
       Axillary glands enlarged, fleshy tender
- Diagnosis:** (1) Sector shape  
 (2) Anatomical boundaries  
 (3) Impalpable against thorax  
 (4) No fibrous contractions

- Diff. diag** Is it primary ?  
Is it secondary ? to ductal obstruction
- (1) Fat necrosis
  - (2) Chronic septic mastitis
  - (3) Chronic specific mastitis
  - (4) New growths benign and malignant
- Compl** (1) Cystic degeneration Polycystoma  
(2) Fibro-adenoma  
(3) ? Carcinoma 2 %  
: Turnbull's table  
    (a) Chronic interstitial mastitis  
    ↓ (b) Adenomatous hyperplasia  
    ↓ (c) Carcinomatous hyperplasia  
    ↓ (d) Carcinomatous infiltration
- Treat** (1) **Conservative**  
    (A) Internal medications  
        (a) Hormone treatment  
            (a) Testosterone acetate injections  
            (b) Theelin 2 c.c.s. daily injections  
            (r) Ovarian residue tablets 5 gra.  
        (b) Pot. iodide  
    (B) External applications  
        Glycerine-belladonna  
        Scott's ointment  
    (C) Prophylactic X Ray exposures  
    (D) Aspiration of cysts  
        + Injections of 10 min. of 5 % protargol  
        ↓ Excision  
        if (a) Contents bloody  
           (b) Rapid recurrence  
           (c) Dense cyst wall
- (2) **Operative amputation breast**  
    Ind (a) Many cysts  
        (b) Suspected malignancy  
        (c) Age over 50  
        (d) Failure of conservative treatment

### (3) CHRONIC DUCT CATARRH

**Path** Benign desquamative hyperplasia of the duct epithelium

- Clinic** (1) Serous or bloodstained nipple-discharge  
(2) Retraction of a duct-orifice with white-plug  
(3) Cord-ducts  
(4) Sector indurations

- Compl** (1) Duct papilloma  
    (a) Local  
    (b) Diffuse papillomatosis

- (2) Duct carcinoma :  
 (a) Local  
 (b) Multicentric  
 (3) Chronic interstitial mastitis  
 Treat (1) X Ray exposures  
 (2) Radium  
 (3) Amputation breast

## (VI) TUMOURS OF THE BREAST :

### *Classification*

- Path (A) Innocent tumours  
 (a) Epithelial  
 (1) Duct papilloma  
 (2) Pure adenoma  
 (b) Connective tissue  
 (1) Fibroma  
 (2) Lipoma  
 (3) Myxoma  
 (c) Combined  
 Fibro-adenoma  
 (a) Hard  
 (β) Soft  
 (γ) Cystic  
 (B) Malignant tumours  
 (a) Epithelial  
 Carcinoma  
 (α) Spheroidal acinar  
 (β) Columnar duct  
 (γ) Basal skin  
 (b) Connective tissue  
 Sarcoma Round, spindle, mixed,  
 chondro

- Morb. anat (A) Epithelial tumours :  
 (a) Innocent  
 (1) Duct papilloma  
 (2) Pure adenoma  
 (b) Malignant  
 Carcinoma  
 (B) Connective tissue tumours  
 (a) Innocent  
 (1) Fibro-adenoma  
 (2) Fibroma  
 (3) Lipoma  
 (4) Myxoma  
 (b) Malignant  
 Sarcoma

- Path The epithelium in a duct or acinus, grows  
 (A) Outwards Away from the lumen  
 (a) Imitating normal gland tissues  
 Adenoma

- (b) Disorderly
  - (a) In a tubular manner  
Adeno-carcinoma
  - (β) Diffusely infiltrating
    - (1) Acinar carcinoma
    - (2) Duct carcinoma
- (B) Inwards Into the lumen
  - (a) Regularly organised  
Duct papilloma
  - (b) Disorderly infiltrating  
Duct carcinoma

# (1) FIBRO-ADENOMA OF THE BREAST

**Def** A new growth consisting of an encapsuled mass of fibrous tissue containing tubes or spaces lined by epithellum and arising from periductal tissues.

## (A) HARD FIBRO-ADENOMA

**Synonym** Peri-canalicular fibro-adenoma

**Etio** Puberty to 30 pregnancy

**Path** Epithelial tubes surrounded by concentrically arranged fibrous tissue

**Clinic** Lump in the breast

Firm, elastic, mobile encapsuled palpable against the thorax, discrete, slow growing

**Diff. diag** (a) Tense cyst or chronic abscess  
(b) Carcinoma  
(c) Fat necrosis  
(d) Sarcoma  
(e) Gumma

**Treat** Excision Gaillard Thomas method

## (B) SOFT FIBRO ADENOMA

**Synonym** Intra-canalicular fibro-adenoma

**Etio** age 30 to 50

**Path** Convoluted and infolded complicated anastomosing masses of richly cellular fibrous tissue lined by epithellum projecting and filling the ductal lumen.

**Clinic** Lump in the breast as in (A), except

- (a) Rapid growth
- (b) Soft consistency
- (c) Large irregular size
- (d) No fibrous contraction signs

**Diff. diag.** (1) Encephaloid carcinoma  
(2) Sarcoma  
(3) Hypertrophy

**Treat** Amputation breast



## (C) CYSTIC FIBRO ADENOMA

Synonym : Cystadenoma

Sero-cystic disease of Brodie

Def A soft fibro-adenoma with multiple cysts

Path (a) Soft fibro-adenoma

+ (b) Multiple cysts due to

(a) Collection of fluid in epithelial spaces

+ (β) Mucoid degeneration of fibrous stroma

Clinic Lump in the breast as in (B)

+ (a) Multilobular

(b) Fluctuating areas

Diff. diag (1) Chronic cystic mastitis

(2) Cystic duct papilloma

(3) Cystic sarcoma

(4) Mucoid or colloid carcinoma

Compl Ulceration and fungation

Treat Amputation breast

## (D) FUNGATING CYSTIC FIBRO-ADENOMA

Synonym Fungating cystadenoma

Path Ulceration and fungation of fibro-adenomatous tissue

Clinic (1) Cystic fibro-adenoma

↓ (2) Ulceration

↓ (3) Fungation of lobulated and foliated fibro-adenomatous tissue

Compl Infection

↓ Inflammation

↓ Ulceration

↓ Hemorrhage

Diff. diag (1) Encephaloid carcinoma

(2) Gumma

(3) Fungating sarcoma

Treat Amputation breast

## (E) PURE ADENOMA

Etiology Very rare

Puberty → menopause

Path Normal acini with (a) No ducts

(b) Minimum supporting tissue

(c) No Fat

Clinic Lump soft, discrete mobile, encapsulated

Treat (1) Enucleation

(2) Excision

(3) Amputation breast

*Secondary changes in fibro-adenoma*

(1) Rapid growth in pregnancy

(2) Hyaline degeneration } in lactation

(3) Mucoid degeneration }

- (4) Cyst formation in lactation
- (5) Malignant metaplasia
  - (a) Carcinoma from epithelial part
  - (b) Sarcoma from mesothelial part

## (2) PAPILLOMATA OF THE BREAST

### (A) PAPILLOMA OF THE NIPPLE

(See under Nipple)

### (B) DUCT PAPILLOMA

**Def** An epithelial tumour arising from the lining cells of a large duct and projecting inwards into the lumen of the duct giving rise to

- (a) Blood stained nipple-discharge
- (b) Sub-areolar local swelling
- (c) Proximal sector mastitis

and sometimes degenerating into duct carcinoma

**Etio** Menopause

**Path** Papillary growth

- (a) Consisting of vascular branching cores of delicate connective tissue covered by hy perplastic columnar epithelium

and (b) Projecting into the lumen of a dilated duct from its wall

**Clinic** (1) Intermittent blood stained or serous nipple-discharge

↓ (2) Vaguely indurated and granular sector of the breast

↓ (3) Sub-areolar small firm tumour

or (3) Sub-areolar fluctuating cyst  
Cystic duct papilloma

or (3) Sub-areolar fungating papillomatous masses  
Fungating papillary cyst-adenoma

**Diff diag** From any cyst tumour or lump of the breast

**Compl** (1) Duct carcinoma  
(2) Chronic interstitial mastitis

**Treat** (1) Amputation breast  
(2) Radium

### (C) INTRA-CYSTIC PAPILLOMATA

**Etio** (1) Chronic cystic mastitis

(2) Cyst-adenoma

(3) Cystic duct papilloma

**Path** Papillomatous growths from the surface epithelium of the wall of a cyst

**Clinic** (1) Change from serous to blood stained nipple-discharge

(2) Fungation

(3) Biopsy After excision of etiology

**Diff. diag Carcinoma**

- Compl** (1) Fungation → ulceration → hæmorrhage  
 (2) Malignant metaplasia Reclus disease
- Treat** (1) Amputation breast  
 (2) Radium

**(3) CARCINOMA OF THE BREAST**

**Def** Entrance of mammary epithelium into the tissue spaces through the basement membrane and its unbridled proliferative infiltration of them.

**Eto** Frequency 1 in 3 of female cancers  
 Age Menopause

**Sites** (a) Upper and outer quadrant  
 (b) Nipple

**Factors** (a) Dysfunction Lack of lactation  
 (b) Trauma Chronic irritation  
 (c) Evolutional hyperplasias  
 (1) Chronic interstitial mastitis  
 (2) Chronic duct catarrh  
 (d) Benign tumours  
 (1) Fibro-adenoma  
 (2) Duct papilloma  
 (3) Intra-cyatic papilloma

**Path** (1) Origin  
 (A) Alveolar or acinar Spheroidal  
 (B) Duct Columnar  
 (C) Skin of the nipple  
 (a) Basal-celled  
 (b) Squamous

**(2) Classification**

There is a regular tug of war between  
**Epithelial proliferation vs. Tissue fibrosis**

Epithelium	Fibrosis	Condition
++++	o	Mastitis Carcinomatosa
+++	+	Encephaloid
++	++	Pseudo-fibro-adenomatous
+	+++	Scirrhus
Trace	++++	Atrophic scirrhus

**(A) Spheroidal: From alveoli**

- (1) Mastitis Carcinomatosa: 2%  
 (2) Encephaloid: 16%  
 (3) Scirrhus 60%  
 (4) Atrophic Scirrhus: 5%  
 (5) Colloid Carcinoma 1%

- (B) Columnar From (a) Ducts  
(b) Intra-cystic
- (1) Duct carcinoma 8%  
(a) Single  
(b) Multicentric
- (2) Intra cystic carcinoma 2%
- (3) Adeno-carcinoma
- (C) Basal-celled From nipple  
Paget's disease 5%
- (D) Squamous From skin
- (3) *Dissemination of breast carcinoma*
- (I) *Methods*
- (A) Infiltration  
Direct molecular attack and replacement  
in the tissue spaces
- (B) Permeation : Lymphatic  
Continuous multiplication along a tube,  
with or against the current
- (C) Embolism  
(a) Lymphatic  
(b) Blood  
Malignant embolus cut and carried  
away by the current of the fluid  
circulating and its arrest at some  
distant place, which becomes the  
scene of activity
- (D) Trans-culomic implantation  
Implantation on a lower surface, after  
falling down to it through the space of  
an internal cavity by the gravity
- (E) Propulsion Very rare  
? Multicentric carcinoma
- (II) *Tissues affected*

*Local* (1) Breast

- (a) Glandular tissue  
Via (a) Infiltration  
(b) Milk ducts  
(r) Lymphatics
- (b) Pectoral muscle ← pectoral fascia
- (c) Skin (a) Cancer *en cuirasse*  
(b) Secondary nodules  
(r) Malignant ulceration
- (2) Lymph glands  
(a) Axillary (a) Permeation  
(b) Lymphatic embolism

- (b) Parasternal (a) Permeation  
 (β) Lymphatic embolism  
 (c) Supra-clavicular (α) Primarily  
 (β) Secondary to (b)
- (3) Bony thoracic wall Infiltration
- Distant* (1) Abdomen
- Tissues* (a) Peritoneum  
 (b) Liver  
 (c) Omentum  
 (d) Ovaries  
 (e) Pelvis
- Methods* (A) Epigastric invasion  
 (a) Breast  
 ↓ (b) Epigastric rectus sheath  
 ↓ (c) Linea alba  
 ↓ (d) Extra peritoneal tissue  
 ↓ (e) Peritoneum  
 (B) Retro-peritoneal invasion:  
 (a) Breast  
 ↓ (b) Pleura  
 ↓ (c) Diaphragm posterior  
 ↓ (d) Peritoneum  
 (C) Diaphragmic invasion  
 Through anterior diaphragm
- (2) Thorax
- Tissues* (a) Mediastinal glands  
 (b) Pleura  
 (c) Lungs
- Methods*
- (A) Lymphatic invasion  
 (a) Parasternal glands  
 ↓ (b) Anterior mediastinal glands  
 ↓ (c) Thoracic glands
- (B) Chest wall infiltration  
 (a) Intercostal spaces  
 ↓ (b) Pleura  
 ↓ (c) Lungs
- (C) Cervical invasion  
 (a) Supra-clavicular glands  
 ↓ (b) Dome of the pleura  
 ↓ (c) Pleura and lungs
- (3) Brain
- Methods*
- (A) Blood embolism  
 (B) Cervical lymphatic permeation:  
 (a) Supra-clavicular glands  
 ↓ (b) Inferior cervical glands

- ↓ (a) Superior cervical glands
- ↓ (d) Basal cranial glands
- ↓ (e) Intra-cranial permeation

(t) **Bones**

- Tissues*
- (a) Ribs
  - (b) Sternum
  - (c) Vertebrae
  - (d) Humerus
  - (e) Femur

*Methods*

- (A) Lymphatic permeation Handley
- (B) Blood embolism Pacey

(5) **Opposite axillary glands and breast**

*Methods*

- (A) Independent
- (B) Retrograde lymphatic permeation
  - (a) Breast primary
  - ↓ (b) Midline crossed
  - ↓ (c) Opposite axillary glands
  - ↓ (d) Opposite breast

*Pathological effects of carcinoma on clinics*

(A) **Infiltration**

- (1) Fixity
- (2) Induration
- (3) Loss of discrete boundaries
- (4) Adhesions
- (5) Actual infiltration or fungation

(B) **Post permeation fibrosis**

- (1) Retractions
- (2) Deviations
- (3) Displacements
- (4) Dimpling or shrinking
- (5) Adhesions

(C) **Lymphatic obstruction**

- (1) Peau d orange
- (2) Cancerous pachydermia
- (3) Brawny arm
- (4) Serous effusions

(D) **Failure of nutrition**

- (1) Ulceration
- (2) Umbilication

(E) **Metastases**

- (1) Lymph glands enlargement
- (2) Skin around nodules  
ulcers

- |                    |  |
|--------------------|--|
| (3) Thorax         | } (a) Effusions<br>(b) Growths<br>(c) Pressure effects |
| (4) Abdomen        |  |
| (5) Bones erosions |  |

# Clinic of breast carcinoma

## (A) Local signs

### (1) Breast

(A) Lump Single, hard fleshy-soft palpable, non-discrete, irregular

(B) Ulcer Malignant

(a) Fixed and merging in breast ties.

↓ (b) Fixed to the muscle

↓ (c) Fixed to the thoracic wall

### (2) Nipple

(a) Retraction

(b) Deviation

(c) Displacement

(d) Discharge

### (3) Skin :

(a) Puckering

(b) Adhesions

(c) Lymphoedema

(a) Peau d orange pig skin

(β) Pachydermia leathery skin

(d) Cancer en cuirasse

Nodular or diffuse infiltration

(a) Nodules

(f) Ulceration malignant ulcer

(g) Fungation

## (B) Regional signs

### (1) Axillary glands

Enlarged hard discrete → matted → fixed

### (2) Supra-clavicular glands : Enlargement

### (3) Brawny arm : Elephantiasis + paralysis

## (C) Distant signs

### (1) Bones

(a) Local pain and tenderness

(b) Pathological fracture

(c) Deformity

### (2) Abdomen

(a) Epigastric angle

(a) Pain and tenderness

↓ (β) Subcutaneous nodules

- (b) Liver enlargement  
knobby → umbilicated
- (c) Peritoneum ascitis hæmorrhagica
- (d) Omentum nodular feel
- (e) Pelvis
  - (a) Krukenburg's tumours
  - (β) Pouch of Douglas metastases
- (3) Thorax
  - (a) Mediastinal glands enlargement
  - (b) Pleura blood-stained effusion
  - (c) Lungs
    - (a) Signs of bronchitis
    - (β) X Ray
- (4) Opposite breast and axillary glands

*Local signs in different forms of carcinoma*

- (1) Colloid carcinoma
  - (a) Elderly age menopause
  - (b) Slow growth
  - (c) Enormous size
  - (d) Soft feel pseudo-fluctuation
  - (e) More mobility
  - (f) Signs of fibrosis absent
  - (g) Low malignancy
  - (h) Translucent areas on biopsy
- (2) Atrophic scirrhus
  - (a) Thin and very aged patients
  - (b) Very chronic course
  - (c) Fibrous signs very marked  
Atrophied breast
  - (d) Lump impalpable
  - (e) Relation to axillary glands

	growth	glands
(a)	+	+
(β)	+	—
(γ)	—	+

- (3) Scirrhus carcinoma
  - (a) Between 35 and 60
  - (b) Moderate rate of growth
  - (c) Moderate size
  - (d) Hard feel
  - (e) Fibrosis signs marked
  - (f) Moderate malignancy
- (4) Encephaloid carcinoma
  - (a) Young and fat patients 30—45
  - (b) Rapid rate of growth
  - (c) Large size
  - (d) Soft feel



- (e) Fibrosis signs not marked
- (f) High malignancy
- (g) Ulceration and fungation
- (5) **Mastitis carcinomatosa**
  - (a) Lactating patients in prime of youth
  - (b) Extremely rapid growth and course
  - (c) Involvement of whole breast
  - (d) Pseudo-inflammatory signs
    - (1) Redness
    - (2) Induration
    - (3) Oedema : Pencil orange
    - (4) Toxaemia
  - (e) Negative aspiration in a case of suspected acute mammary abscess
- (6) **Duct carcinoma**
  - (A) Large duct
    - (a) Blood-stained nipple-discharge
    - (b) Subareolar small irregular tumour
    - (c) Sector shaped induration
  - (B) Small duct
    - Ordinary spheroidal celled carcinoma
  - (C) **Multicentric or mastitic carcinoma**
    - Syn Diffuse intraductal carcinoma
    - Path Chronic duct catarrh
      - ↓ Diffuse intraductal papillomatosis
      - ↓ Diffuse intraductal carcinomatosis
    - Clinic (a) Diffuse lumpiness
    - (b) Discharge from nipple
- (7) **Intra-cystic papilliferous carcinoma** Reclus
  - (a) Biopsy Canliflower or papillomatous growth within a cyst removed
  - (b) Fungation papilliferous or canliflower mass after rupture of a cyst
- (8) **Paget's disease** (See under Nipple)
- (9) **Carcinoma of male breast**
  - Etio 1%
  - History of injury or chronic irritation
  - Clinic Button like induration
  - Early adhesions
- (10) **Peripheral carcinoma**
  - Syn Carcinoma of axillary tail
  - Clinic Localised lump near the axillary margin
  - Diff. diag Enlarged axillary glands
- (11) **Impalpable carcinoma**
  - Path Microscopical primary

- Clinic (a) No primary detected  
 (b) Axillary metastases +  
 Treat Radical excision of the breast

*Special signs of carcinoma breast*

(A) Exploration

- Tech (1) Enucleation of the growth without incision into it  
 or (2) Excision of that part of the breast which contains the growth  
 or (3) Amputation of the whole breast containing the growth

↓ (B) Macroscopic examination After bisection

- (a) Homogeneity of tissue of the growth  
 (b) Difference from normal tissue  
 (a) By vision  
 (β) By feel  
 ( ) Absence of capsule with irregular infiltration of tissues

↓ (C) Microscopic examination After section

*Clinical pictures of axillary glands in breast carcinoma*

(1) Not enlarged

- (a) Not affected  
 (b) Microscopically affected

In every case of carcinoma breast, axillary glands must be taken to be affected and removed though enlarged or not.

(2) Enlarged

- Path (a) Due to infection only tender  
 (b) Due to malignant metastases

Clinic (1) Number

- (a) Single gland  
 ↓ (b) Group of glands  
 ↓ (c) Regional glands  
 ↓ (d) Extra-regional glands

(2) Consistency

- (a) Stony hard  
 or (b) Hard  
 or (c) Flethy  
 or (d) Soft  
 or (e) Fluctuating

(3) Mobility

- (a) Freely mobile  
 ↓ (b) Adherent  
 ↓ (c) Matted  
 ↓ (d) Immobile

## Diff. diag. of Carcinoma Breast

From every other condition of the breast

(1) Trauma			
	Fat necrosis	from	Scirrhus
(2) Acute inflammations			
	Acute mastitis	from	(a) Pseudo-inflammatory
			(b) Multicentric
(3) Chronic inflammations			
	Local mastitis	from	Scirrhus
	Chronic abscess	from	(a) Encephaloid
			(b) Colloid
(4) Specific inflammations			
	Tuberculosis	from	Scirrhus
	Gumma	from	Scirrhus
	Elephantiasis	from	(a) Pseudo-inflammatory
			(b) Multicentric
(5) Hyperplasias			
	Megalomastia	from	(a) Pseudo-inflammatory
			(b) Multicentric
	Chronic mastitis	from	(a) Scirrhus
			(b) Duct carcinoma
(6) Tumours			
	Fibro-adenoma	from	(a) Scirrhus
			(b) Encephaloid
	Duct papilloma	from	Duct carcinoma
(7) Skin conditions			
	Eczema	from	Paget's disease

## Treat (1) Prophylactic:

(A) Removal of any lump in the breast after 40

(B) Prophylactic X Ray radiation of chronic mastitis

(C) Education of the public early diagnosis

## (2) Curative

(1) Radical operation for carcinoma breast

Removal of

(1) Circular skin and subcutaneous tissues around the growth

(2) Whole of the breast

(3) Circle of deep fascia

Clavicle



Beyond midline ← growth → lat. dorsl



Rectus sheath

- (4) **Muscles** Both pectorals  
 Serratus anterior  
 Lat. dorsi  
 Subscapularis fascia  
 Rectus sheath  
 External oblique

(5) **Axillary contents**

- (6) Supra-clavicular fosse at times

*Preserving*

- (1) Axillary vessels
- (2) Cephalic vein if possible
- (3) Nerve of Bell
- (4) Long subscapular nerve
- (5) Cords of the brachial plexus

*Contraindications*

(A) *Local*

- (1) Skin affection  
 More than 2" from the growth
  - (a) Cancer on cuirass
  - (b) Skin infiltration
  - (c) Malignant nodules
- (2) Fixation to bony thorax
- (3) Carcinomatous mastitis
- (4) Atrophic scirrhus in old age

(B) *Regional*

- (1) Axillary glands fixed  
 to (a) Bony thorax  
 (b) Main vessels artery  
 (c) Main nerves
- (2) Brawny arm
- (3) Supra-claviculars hard and fixed  
 With growth in the lower half
- (4) Nodules at the intercostal spaces

(C) *Distant*

- (1) Opposite axillary glands or breast involved
- (2) Abdominal metastases
  - (a) Liver + + or jaundice
  - (b) Palpable masses
  - (c) Ascitis
  - (d) Ovarian tumours
  - (e) Pouch of Douglas

(3) **Thoracic metastases**

- (a) Intercostal nodules
- (b) Mediastinal pressure signs
- (c) Pleurisy with effusion
- (d) X Ray lung

(4) **Bone metastases**

- (a) Localised or referred pain
- (b) Local tenderness
- (c) Local deformity
- (d) Spontaneous fracture
- (e) Local bony erosion

(D) **General**(1) **Age**

- (a) Very old  
with atrophic scirrhus
- (b) Very young  
with mastitis carcinomatosa

(2) **General condition**

- (a) Debility
- (b) Plethora

(3) **Constitutional diseases**

- (a) Diabetes
- (b) Heart disease
- (c) Liver cirrhosis
- (d) Tuberculosis

(4) **Rapid course of the disease**

Even if a carcinoma breast is seemingly inoperable, operation is better provided

- (1) Local growth excisable
- (2) No visceral deposits

**Advantages**

- (1) No local complications
- (2) No axillary complications
  - (a) Brachial neuralgia
  - (b) Arm lymphoedema
- (3) Death from painless metastases
  - (a) Thoracic
  - (b) Bone

(II) **Deep X Rays**

Ind **Superficial but extensive areas**

- As
- (1) Pre-operative
  - (2) Substitute for operation
  - (3) Post operative adjunct
  - (4) Superficial recurrences

**Tech (a) Pre-operative**

Six weeks before operation

**(b) Post-operative**

After healing of the wound

Two courses of three months each with an interval of three months

### (III) Radium

**Ind Deep and small local foci**

**As (1) Substitute to operation**

(2) Addition to operation

(3) Post-operative prophylactic

(4) Local recurrences curative

**Contraind Tumours more extensive than 3 inches**

**Tech As an addition to operation**

	<i>Site</i>	<i>Needles</i>
(1)	Around and in the growth (Interstitial or gridiron)	15
(2)	Axillary cone	5
(3)	Subpectoral	6
(4)	Supra-clavicular	3
(5)	Costo-coracoid membrane	2
(6)	Intercostal spaces 2, 3, 4, 5	1 each
	Total amount	: 66 mgm.
	Needles in position	8-10 days

### Operative results

(A) Cures (5 years) if

80%	Axillary glands
40%	Impalpable
	Palpable

**Prognosis Presence or absence of axillary metastasis**

**(A) Factors favouring growth**

- (1) Youth pregnancy lactation
- (2) Location in inner or lower quadrant
- (3) Low state of differentiation (small called)
- (4) Incomplete and rough surgery
- (5) Low resistance

**(B) Factors retarding growth**

- (1) Senile involution
  - (2) Location in outer and upper quadrant
  - (3) Higher differentiation adeno-carcinoma
  - (4) Colloid degeneration
  - (5) Radical surgery
  - (6) Raised resistance
- With pre and post-irradiation

<i>Factor</i>	<i>Good</i>	<i>Bad</i>
(1) <b>Age</b>	Old	Young
(2) <b>Activity</b>	Nil	(a) Pregnancy (b) Lactation
(3) <b>Stage</b>	Local	Encephaloid
	Regional	Axillary gla. +
	General	Bad health
(4) <b>Course</b>	Slow	Rapid
(5) <b>Build</b>	Fat	Thin
(6) <b>Site</b>	Central	Peripheral
(7) <b>Sex</b>	Females	Males
(8) <b>Treatment</b>	Early	Late

### Recurrences (A) Localised

#### (1) Local

(A) In the scar

(B) Around the scar secondary bosses

#### (2) Axillary Brawny arm brachial neuralgia

#### (3) Parasternal

Clinic

(a) Painful nodules → ulcers

Intercostal spaces along the sternal edge

↓ (b) Superior mediastinal pressure signs

↓ (c) Pleural effusion

#### (4) Supra-clavicular

Path (A) Primary focus in super int. quadrant

(B) Secondary

to (a) Parasternal glands

(b) Axillary glands

Clinic Enlarged glands at the lower and inner angle of the posterior triangle of the neck

#### (5) Spinal:

Clinic Pott's disease in elderly females

Pain + tenderness + deformity + paraplegia

#### (6) Bony:

Clinic (a) Localised pain or tenderness

(b) Pathological fracture

(c) Localised pseudo-periosteomyelitis

(d) X Ray

(B) *Extensive*

- (1) Thoracic Mediastinal, pleural
- (2) Abdominal Liver peritoneum, pelvis

## Treatment of recurrences

## (A) Localised recurrences

- (1) Prophylactic
  - (a) Operative excision  
During radical operation
  - + (b) Radium implantation
  - ↓ (c) Post-operative deep X Ray
- (2) Curative  
Radium implantation

## (B) Extensive recurrences

- (1) Prophylactic
  - (a) Pre-operative deep X Rays
  - (b) Extensive radical operation
  - (c) Post-operative deep X Rays
- (2) Curative  
Deep X Ray exposures

## Procedures With indications

- (A) Radium Localised deep foci
- (B) Deep X Rays Extensive superficial foci
- (C) Ovariectomy bilateral } osseous metastases  
or Irradiation of pelvis }

## Treatment of brawny arm

- (1) Postural
- (2) Handley's lymphangioplasty silk

## Treatment of brachial neuralgia

- (1) Alcohol injection into the nerve plexus
- (2) Amputation

## Post-operative investigations after radical operation

Examine every case every three months or as soon as something wrong is noted

- (1) History losing weight cough pain
- (2) Examine
  - (a) General health
  - (b) Local area
  - (c) Regional area  
Axillary  
Supra-clavicular  
Parasternal
  - (d) Metastatic area  
Thorax  
Abdomen  
Pelvis  
Spine  
Bones

- (3) Radiograph Chest  
Bones



**(4) SARCOMA OF THE BREAST****Etio**

Age 30-50

Causes (a) Trauma  
(b) Fibro-adenoma

Incidence 1% of all malignant growths of the breast

Path (a) Fascial fibro-sarcoma  
(b) Fibro-adenomatous fibro-sarcoma  
(c) Fibro-cystic sarcoma of Brodie  
(d) Lympho-sarcoma  
(e) Chondro-sarcoma

Clinic Large prominent lobulated, soft very rapid, vascular tumour

Diagnosis (1) No signs of fibrosis  
(2) Vascularity  
(3) Very rapid growth  
(4) Internal metastasesDiff diag (1) Soft fibro-adenoma  
(2) Encephaloid carcinoma  
(3) Fungating cyst-adenoma  
(4) Diffuse hypertrophyCompl (1) Fungation  
(2) Secondary hæmorrhage  
(3) Metastases  
(4) CachexiaTreat (1) Early radical operation  
(2) Irradiation by deep X Rays  
Ind Lympho-sarcoma**(5) OTHER RARE TUMOURS OF THE BREAST**(A) Teratoma  
(B) Squamous carcinoma  
(C) Melanoma**(VII) CYSTS OF THE BREAST:****(1) CYSTS FROM LARGER DUCTS Single****(A) Galactocoele**Clinic (a) Lactation  
(b) Milky discharge from nipple  
(c) Single subareolar cyst

Treat Excision

Post. compl Milk fistula

**(B) Simple subareolar cyst**Clinic (a) Serous or absent nipple-discharge  
(b) Single subareolar cystTreat (a) Tapping + Injection of 10 min. of 1% Protargol  
(b) Excision

- (2) CYSTS FROM SMALLER DUCTS Multiple
  - (A) Chronic interstitial mastitis
  - (B) Chronic duct catarrh
- (3) CYSTS FROM LYMPHATIC SPACES
- (4) CYSTS FROM SIMPLE TUMOURS
  - (A) Cystic fibro-adenoma  
Serocystic disease of Brodie
  - (B) Cystic duct papilloma
- (5) CYSTS FROM MALIGNANT TUMOURS
 

Rapid and large

  - (A) Carcinoma
  - (B) Sarcoma
- (6) PARASITIC CYSTS Hydatid
 

*Special signs of breast cysts*

  - (1) Translucency
  - (2) Aspiration
  - (3) Exploration
  - (4) Biopsy

#### (VIII) MASTODYNIA :

- Etiol. Neurasthenia  
 Path. No organic lesion  
 Clinic. Pain and tenderness in premenstrual period  
 Diff. diag. From any organic lesion  
 Treat. Ovarian tablets 5 grs. once a day

#### (IX) OPERATIONS ON THE BREAST :

- (1) MAMMARY ABSCESS Incision and drainage
 

Tech. (A) Radial incision (See under Acute Mammary Abscess)  
 (B) Sheild's method ( " " " " " )  
 (C) Bailey's method ( " " " " " )  
 (D) Retro-mammary drainage (See under " " )

After-treat (See under Mammary Abscess)

Post. compl. (1) Milk fistula  
 (2) Delayed healing
 
  - (a) Lack of rest support and sling
  - (b) Pocketing
  - (c) Specific
  - (d) Lack of resistance

(3) Fibrosis deformed or retracted nipple
- (2) ENUCLEATION OF A SIMPLE TUMOUR Fibro-adenoma
 

(A) Direct method
 
  - (1) Radial incision down to the capsule

↓ (2) Incision of the capsule

↓ (3) Enucleation of the tumour from inside the capsule

(B) *Gaffard Thomas method*

- (1) Incision Submammary sulcus  
Lower and outer quadrant
  - (2) Strip up the breast from the pectorals
  - (3) Radial incision in the deep aspect of the breast
  - (4) Excision or enucleation from the deeper aspect of the breast
  - (5) Buried sutures to approximate breast tissue
  - (6) Drainage
- Post. compl (1) Milk fistula  
(2) Haematoma → sepsis

## (F) PARTIAL EXCISION OF THE BREAST

- Ind (1) Non-malignant local condition  
(2) Suspicious lump requiring biopsy

Tech (A) *Direct method*

- (1) Radial local incision
- (2) Wedge-shaped resection  
Of the lobes containing the lump
- (3) Buried sutures

(B) *Gaffard Thomas' method:*

Excision through the deeper aspect of the breast, stripped up through the submammary incision

## (4) MASTECTOMY Amputation of the breast

- Ind (1) Gynaecomastia  
(2) Simple hypertrophy megalomastia  
(3) Chronic interstitial mastitis after 50  
(4) Chronic duct catarrh  
(5) Tuberculosis  
(6) Actinomycosis  
(7) Elephantiasis  
(8) Discharging chronic sinuses  
(9) Large or fungating innocent tumours  
(10) Large or multiple cysts  
(11) Suspected malignancy:

For biopsy

(12) *Inoperable malignancy with local complications:*

- (a) Ulceration
- (b) Fungation

Tech: (A) *Without preservation of nipple:*

- (1) Elliptical incision  
Includes affected skin
- (2) Elevation of skin flaps  
(a) Keep some fat  
(b) Keep warm
- (3) Delimitation of the breast  
By exposure of pectoral fibres
- (4) Dissect out the breast
- (5) Haemostasis  
(a) Long thoracic artery  
(b) Sternal arteries

- (6) Drainage
  - (a) Axillary
  - (b) Epigastric
  - (c) Down and out quadrant
- (B) With the preservation of nipple
  - (1) Gaillard Thomas incision
  - (2) Excision through the deeper aspect
- Post. compl (A) Local
  - (1) Hematoma
  - (2) Sepsis
  - (3) Sloughing of the flaps
  - (4) Non-healing
  - (5) Scar abnormalities
- (B) General
  - (1) Shock
  - (2) Chest complications
  - (3) Heart failure
- (5) Mammoplasty
  - Plastic operations on the breast
  - Ind
    - (a) Sagging breast
    - (b) Abnormal size
    - (c) Abnormal shape
  - Object Restoration of normal size and shape
  - Tech
    - (a) Preserve the nipple with areola
    - (b) Preserve the blood supply
- (6) RADICAL OPERATION FOR BREAST CARCINOMA OR SARCOMA
  - (A) Pre-operative considerations
    - (1) Operability of the growth
      - Every carcinoma of the breast is operable unless contraindicated (See under Carcinoma Breast)
    - Contraindications
      - (1) Local
      - (2) Regional
      - (3) Distant
      - (4) General
  - (2) Pre-operative preparation
    - (A) Heart and circulatory system :
      - Examine
        - (a) The heart
        - (b) Blood pressure
        - (c) Condition of arteries
      - Treat:
        - (a) Course of digitalis
        - (b) Course of Thyroid and Lugol's sol.
    - (B) Blood :
      - Examine
        - (a) Hemoglobin
        - (b) Coagulation time
        - (c) Bleeding time
      - Treat
        - (a) Blood transfusions
        - (b) Hematinics
        - (c) Coagulants
    - (C) Respiratory system :
      - Examine The pleurae and lungs

- Treat (a) Prophylactic anti-catarthal vaccine  
(b) Camphor in oil

(D) Urinary system

Examine The kidneys and urine

- Treat (1) Hydrotherapy  
(2) Diuretics  
(3) Urinary antiseptics if septic

(E) Digestive system

Examine The liver

Treat Regulation of the bowels

(F) Metabolic or general diseases

Examine for (a) Nephritis  
(b) Diabetes  
(c) Tuberculosis etc.

(G) Nervous system sedatives assurance

(H) General preparation

- (1) Blood transfusions  
(2) Glucose (a) By mouth  
(b) Intravenous

(Subcutaneous insulin 10 units to be followed  
intravenous glucose 25% 20 c.c.)

(3) Soda-bi-carb

- (4) Hydrotherapy (a) Mouth  
(b) Rectum  
(c) Intravenous on table

(I) Prophylaxis of infections:

- (1) Course of anti-catarthal vaccine  
For respiratory complications  
(2) Course of mixed pyococcal vaccine;  
For wound infections

(J) Pre-operative irradiation

- Ind (a) Carcinoma in young  
(b) Carcinoma in pregnancy  
(c) Encephaloid carcinoma  
(d) Axillary glands + +

Time 4-6 weeks before operation

(B) Anaesthesia:

General Chloroform-ether mixture

Pure ether → (a) Respiratory catarrh  
(b) Haemorrhage

Pure chloroform → Acidosis

(C) Technique

- (1) Rodman axilla → breast

Advantages (a) Tedious part done first

(b) Better control over bleeding

(c) Contra-indications discovered early

(d) Early division and sealing of lymphatics

(e) Exposure of thorax wall late and minimum

(2) Handley: breast → axilla

**Advantages** (a) No spilling of carcinomatous cells from divided lymphatics in the early part of the operation

**Steps (A) Axillary dissection**

- (1) Incision Parallel to and 2 finger-breadth inside the delto-pectoral sulcus  
Clavicle to pectoralis insertion
  - (2) Division of pectoralis major insertion
  - (3) Division of pectoralis minor insertion
  - (4) Division of costo-coracoid membrane
  - (5) Dissection of axillary cellular tissue
    - (a) Apex to base
    - (b) Axillary vein → inwards
  - (6) Ligation of the branches of axillary vessels
  - (7) Take care of
    - (a) Long thoracic nerve inner wall
    - (b) Thoraco-dorsal nerve posterior wall
    - (c) Superior thoracic art. apex
    - (d) Axillary vein lateral wall
- Points** (a) Soft handling  
(b) Immediate ligation of branches  
(c) Soft tissue cover  
(d) No drain in contact
- Excise, if** (a) Adherent glands  
(b) Operative injury
- Sequester** (a) Brawny arm  
(b) Embolism  
(c) Cephalic vein if possible

**(B) Excision of the breast :**

**(a) Surgical excision**

- (1) Incision
  - (a) Ring incision around the growth
  - (b) Axillary tail across axillary base
  - (c) Eniform tail towards epigastrium
- (2) Elevation of skin flaps
  - (a) One foot diameter all around
  - (b) In the mid-plane of subcutaneous tissues
  - (c) Wrap up in hot saline towels
  - (d) No buttonholing
  - (e) Methods (a) Dissection  
(b) Transfusion
- (3) Delimitation of deep fascia 10 inches all round  
**Boundaries**
  - (a) Superior clavicle
  - (b) Medial inner margin of opposite pectoralis
  - (c) Lateral inner margin of deltoid  
posterior axillary fold  
anterior part of latissimus dorsi
  - (d) Inferior anterior rectus sheath on both sides

- (4) Division of muscles
  - (a) Pectoralis major whole
  - (b) Pectoralis minor
  - (c) Serratus anterior slips
  - (d) External oblique slips
- (5) Haemostasis
  - (a) Branches of axillary vessels
  - (b) Perforating branches of int. mammary
- (b) Dithery excision
 

Advantages

  - (1) Destruction of cancer cells
  - (2) Warmth preserved
  - (3) Less haemorrhage
  - (4) Less shock
  - (5) Good healing

Disadvantages

  - (1) Ether contra-indicated
  - (2) Lowered resistance to pyococci
  - (3) Overheating  $\rightarrow$  sloughing
- (c) Additional steps
  - (1) Implantation of radium tubes or needles  
(See under Carcinoma Breast)
    - (a) Supra-clavicular
    - (b) Intercostal parasternal
    - (c) Axillary
  - (2) Excision of supra-clavicular glands  
Ind (a) Palpable enlargement  
or (b) Primary in the upper quadrant  
or (c) Highest axillary glands cancerous
  - (3) Drainage:
    - (a) Epigastric
    - (b) Costal
    - (c) Axillary
  - (4) Approximation of the skin
    - (a) Avoid tension on sutures
    - (b) If skin insufficient
      - (a) Flap advancement methods
      - (b) Thiery's grafting

#### Difficulties in the operation

- (1) Shock or collapse
  - (2) Adiposity
    - (a) Good for local condition
    - (b) Bad for general condition
  - (3) Respiratory failure
  - (4) Haemorrhage
    - (a) Retraction of intercostal arteries
    - (b) Trauma to axillary vein
    - (c) Incomplete haemostasis
    - (d) Long coagulation time
  - (5) Difficulty in closure of the wound
- Treat
- (a) Advance flaps
  - (b) Skin grafting





- (5) Scar complications:
  - (a) Weak - rest, skin-graft
  - (b) Adherent massage, mobilisation
  - (c) Painful alcohol injection in intercostal :  
at the time of operation
  - (d) Keloid avoid friction
- (6) Recurrences
- (7) Arm complications:
  - (a) Limited movements: early mobilisation
  - (b) Brawny arm

#### Brawny arm

- Causes**
- (1) Pre-operative
 

Malignant infiltration of all lymphatics and veins & the shoulder or/and of axillary vein
  - (2) Post-operative:
    - (A) Lymphatic obstruction:
 

**Cause** Removal of axillary lymph glands and

**Clinic** Persistent brawny oedema with recurrent inflammatory attacks
    - (B) Venous obstruction
 

**Cause** Thrombosis or scar pressure

**Clinic** Soft pitting oedema reacting to posture (elevation & abduction)
    - (C) Lymphatico-venous obstruction
 

**Clinic** Soft, pitting, reacting oedema

↓ Persistent brawny oedema

**Clinic** Elephantiasis and partial paralysis of the superior extremity

- Diff. diag**
- (1) Fibrosis
  - (2) Elephantiasis neuromatosa
  - (3) Diffuse lymphangioma
  - (4) Acute cellulitis

- Treat**
- (1) Postural Elevation and abduction
  - (2) Sampson Handley's silk lymphangio-plasty
  - (3) Hoodoleon's operation

## (X) IMPORTANT POINTS

### (A) The Nipple

- (1) Retraction of the nipple is
  - (a) A sign of carcinoma breast
  - (b) An etiology of milk congestion → acute mastitis → acute mammary abscess.
- (2) Any indolent affection of the nipple ? chancre.
- (3) Mother of a syphilitic child does not suffer from chancre.
- (4) Skin disease round about nipple
 

? (a) Eczema

? (a) Paget's disease

- (5) Discharge from the nipple
  - (a) Serous chronic interstitial mastitis
  - (b) Bloody duct papilloma or carcinoma
- (6) Persistent serous discharge from nipple in a patient of cancer age do mastectomy
- (7) Paget's disease theories
  - (a) Handley post-cancerous lymph-œdema
  - (b) Cheate duct carcinoma
  - (c) Turnbull basal-celled carcinoma
  - (d) Mair pre-cancerous duct-epithelial proliferation

#### (B) Trauma of the breast

- (1) Traumatic fat necrosis may be indistinguishable clinically from carcinoma breast.

#### (C) Acute inflammations of the breast

- (1) Acute mastitis is of two kinds
  - (a) Obstruction mastitis cord like ducts ductitis
  - (b) Abrasional mastitis red streaks lymphangitis
- (2) Milk congestion → acute mastitis → mammary abscess.
- (3) No incision in the breast should be made unless signs of abscess are definite
- (4) Acute mammary abscess
  - (a) Radial incision
  - ↓ (b) Counter incision
  - + (c) Suction pump.
- (5) Other treatments of acute mammary abscess
  - (a) Aspiration + lavage.
  - (b) Small incision + closed drainage + lavage.
- (6) Breaking down all septa is a most important step in the operation for mammary abscess.
- (7) Non-amelioration of symptoms and signs after drainage of acute mammary abscess
  - ? Pocket
  - ? Badly placed drainage tube
  - ? Some special kind of infection
- (9) Omission of a sling to the upper extremity invites delayed healing of a breast wound.

#### (D) T B breast

- (1) Pain and tenderness are important distinguishing features of tuberculosis of the breast from carcinoma breast.
- (2) A supposed cancer of the breast without axillary gland enlargement occurring under the age of 35 is likely to prove on biopsy to be tubercle.

- (3) A painless lump in the breast, slow in growth, which goes on to abscess → rupture → sinus, at a younger age than carcinoma
  - ? T. B. breast.
- (4) Any chronic induration in the breast, secondarily involving the skin and subcutaneous tissues
  - ? Tuberculosis
  - ? Gumma
  - ? Ulcerating fibro-adenoma
  - ? Carcinoma

(E) Chronic interstitial mastitis

- (1) (a) Lymph-oedema  
↓ (b) Fibrosis → cystic dilatations and granular feel  
+ (c) Epithelial hypertrophy → intra-cystic papilloma  
↓ carcinoma.
- (2) Chronic mastitis is a common involutional disease in menopausal period.
- (3) Chronic interstitial mastitis may lead to malignancy  
(a) Periductal fibrosis → fibro-adenoma → sarcoma.  
(b) Duct-epithelial proliferation → papilloma → carcinoma.
- (4) Chronic interstitial mastitis prepares the soil for malignancy just as cirrhosis of the liver or Paget's bone disease.
- (5) Chronic mastitis and chronic cystic mastitis are stages of the same process which begins with permanent lymph stasis and not infrequently ends in carcinoma. (Sampson Handler)
- (6) Every case of non-cystic chronic mastitis in a woman over 40 should receive a short prophylactic course of deep X Rays as a sedative to the epithelium and should subsequently be seen every three months.
- (7) A breast which has produced more than one cyst should be removed in a patient over 50

(F) Tumours of the breast

- (1) Essential benign tumour of the breast is Fibro-adenoma.
- (2) Border line tumours of the breast are
  - (a) Cystic adenoma
  - (b) Intra-cystic papilloma
  - (c) Chronic cystic mastitis.
- (3) Most common tumours of the breast      carcinoma  
    fibro-adenoma.
- (4) Very large tumours of the breast
  - (a) Soft or cystic fibro adenoma

- (b) Sarcoma
- (c) Encephaloid or mucoid carcinoma.
- (5) Large tumours of the breast with fluctuating areas
  - (a) Cystic fibro-adenoma
  - (b) Cystic duct papilloma
  - (c) Cystic sarcoma.
- (6) Groups of breast tumours
  - (a) Patients under 25 non malignant
  - (b) Patients over 25 possibly malignant

The most helpful clinical evidence against malignancy is youth of the patient (below 25) except in cases of mastitis carcinomatosa.

#### (G) Fibro-adenoma of the breast

- (1) Fibro-adenomas arise from periductal tissues
  - (a) Pericanalicular hard
  - (b) Intra-canalicular soft
  - (c) Cystic.
- (2) Firm encapsuled slow freely mobile tumour in a young breast with no signs of adhesions  
Fibro-adenoma.
- (3) During pregnancy rapid growth of fibro-adenoma may take place and may be mistaken for malignancy

#### (H) Carcinoma breast

- (1) About 2 % of all women of cancer age will develop carcinoma breast.
- (2) Cancer occurs less frequently in a breast that has been a seat of physiological function (lactation) frequently but cancer once developed grows rapidly during the time of physiological activity
- (3) There are three views as to the etiological part of chronic interstitial mastitis in the causation of carcinoma breast.
  - (a) Directly precancerous
    - (a) Epithelial hypertrophy
    - ↓ (β) Papilloma
    - ↓ (γ) Carcinoma
  - (b) Indirectly precancerous  
Prepares the soil as in cirrhosis liver
  - (c) Not precancerous.
- (4) Most carcinomata arise in the ducts as irregular hyperplasia of columnar lining epithelium the original states being
  - (a) Chronic duct catarrh
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? T. B. breast.
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(b) Indirectly precancerous

Prepares the soil as in cirrhosis liver

(c) Not precancerous.

(4) Most carcinomata arise in the ducts as irregular hyperplasia of columnar lining epithelium the original states being

- (a) Chronic duct catarrh
- (b) Duct papilloma

- (5) Skin affections in cancer breast
- (A) Infiltration
    - (a) Ulceration
    - (b) Fungation
    - (m) Cancer en cuirasse
  - (B) Permeation Nodules
  - (C) Fibrosis Adhesions and deformations
  - (D) Lymph-oedema
    - (a) Peau d orange
    - (b) Pachydermia
    - (c) Brawny arm
- (6) Lymphatic phenomenon in breast carcinoma
- (a) Peau d orange
  - (b) Brawny arm
  - (c) Chylous pleurisy
  - (d) Chylous ascitis
- (7) Causes of signs and symptoms of breast cancer are
- (a) Infiltration
  - (b) Fibrosis
  - (c) Lymph-oedema
  - (d) Secondaries
  - (e) Failure of nutrition
- (8) Clinical varieties of carcinoma depend upon the continuous tug-of-war between  
Fibrosis vs. Carcinoma cells
- (a) Mastitis carcinomatosa
  - ↓ (b) Encephaloid carcinoma
  - ↓ (c) Scirrhus
  - ↓ (d) Atrophic scirrhus
  - ↓ (e) Impalpable carcinoma
- (9) Special infiltrations at special sites
- (a) Inner quadrant paraxillary
  - (b) Outer quadrant axillary
  - (c) Upper quadrant supra-clavicular
  - (d) Lower quadrant epigastric
  - (e) Peripheral thoracic wall
- (10) The most important sign of a carcinoma breast is a lump with signs of fibrosis around
- (11) Carcinoma breast examination
- (1) Local
    - (a) Breast
    - (b) Nipple
    - (c) Skin
  - (2) Regional
    - (a) Axillary glands
    - (b) Supra-clavicular glands
    - (c) Arm
  - (3) Distant
    - (a) Thorax effusion
    - (b) Abdomen
      - (a) Epigastrium
      - (b) Liver
      - (r) P V or P R.

- (c) Bones
- (d) Opposite axilla and breast
- (12) Remember the similarity between
  - (a) Acute mastitis
  - (b) Mastitis carcinomatosa
  - (c) Filariol lymphangitis of the breast
- (13) Chief conditions to be differentially diagnosed from carcinoma breast are
  - (a) Fat necrosis
  - (b) Chronic local mastitis
  - (c) Chronic abscess
  - (d) Tuberculoma or gumma
  - (e) Mazoplasia with a cyst
  - (f) Fibro-adenoma
  - (g) Duct papilloma
- (14) Principle of radical operation for carcinoma breast  
Removal intact of the permeated lymph vascular area surrounding the growth in one piece, with the lymph glands which may have been embolically invaded along trunk lymphatics.
- (15) Determine whether a case is operable by exhaustive examination of the patient before undertaking an operation for radical removal of carcinoma breast  
Examinations
  - (1) Local
  - (2) Regional
  - (3) Distant
  - (4) General
  - (5) Special
- (16) Most important contra indications for radical excision of the breast are
  - (a) Local
    - (a) Mastitis carcinomatosa
    - (β) Fixation to the bony thorax
  - (b) Regional axillary glands fixed to
    - (a) Bony thorax
    - (β) Axillary artery
  - (c) Distant any distant metastases
  - (d) General
    - (a) Young age with rapid course
    - (β) Debility
- (17) Do not fail to examine the following before operation for carcinoma breast
  - (a) Axilla
  - (b) Supra-clavicular fossa
  - (c) Pleural cavity
  - (d) Epigastric angle and liver
  - (e) Pelvis
  - (f) Spine or ribs



- (18) Radium for deep and localized lesions  
Deep X Rays for superficial and extensive lesions
- (19) A lump in the breast which is malignant should be removed before it is possible to tell clinically what it is.
- (20) Every doubtful tumour in the breast after the age of 30 must be excised and subjected to biopsy if found carcinomatous radical operation to follow immediately.
- (21) Association of young age, pregnancy and lactation with breast cancer may be accidental but rapid growth and early dissemination in such cases is the invariable rule.
- (22) A great factor in prognosis is the axillary metastases, which is an index of parasternal metastases.
- (23) Important points in bad prognosis are
  - (a) Youth
  - (b) Physiological activity of the breast
  - (c) Rapid course
  - (d) Axillary metastases +
  - (e) Time of treatment
- (24) Adeno-carcinoma and colloid carcinoma have better prognosis.
- (25) If the mammary cancer is confined to breast the patient has 75% chances of a five-year cure if the axillary glands are invaded only 25% chances.
- (26) There is nothing more dramatic in surgery than the action of radium upon carcinomatous metastases.
- (27) Deep X Ray radiation has marked analgesic effect on bone deposits and especially on spinal deposits.
- (28) Ovarian sterilisation (artificial menopause) is of definite palliative value to about one-third of the patients with inoperable or recurrent carcinoma of the breast or osseous metastases.
- (29) Results of the combination of radical surgery with irradiation are superior to those of radical surgery alone.
- (30) Examine every case every three months, after radical excision of breast carcinoma.

# (I) Cysts of the breast

- (1) Subareolar fluctuating swelling
  - (a) Galactocele
  - (b) Simple subareolar cyst
  - (c) Cystic duct papilloma
  - (d) Chronic mastitic cyst
  - (e) Chronic T. B. abscess.

- (2) A breast which has produced more than one cyst should be removed in a patient over fifty
- (3) Cysts in connection with new growths
  - (a) Cystic fibro-adenoma
  - (b) Cystic duct papilloma
- (4) Cysts in connection with involutional mastitis : diagnose from chronic mastitis due to cysts
- (5) Relation of cysts to chronic involutional mastitis is biphasic
  - ↑ Chronic involutional mastitis
  - ↓ Cyst or cysts

#### (j) Operations on breast

- (1) Incision in a breast must always be radial.
- (2) Other favourite incision is in the lower and outer quadrant in the submammary fold.
- (3) It is worth while trying aspiration before open incision and drainage of an abscess.
- (4) Exploration of suspicious tumour  
Excise it in toto without cutting into it : send it for biopsy
- (5) Gaillard Thomas method is good for treatment of deep lesions in the breast.
- (6) Try to preserve nipple and areola wherever possible in removal of the breast for innocent lesions.
- (7) Common causes of non-healing of breast wounds
  - (a) Lack of rest : sling and support
  - (b) Tight sutures
  - (c) General low resistance
- (8) Do not forget the value of massage and mobilisation of breast scar and movements of shoulder joint, as soon as the wound has healed.

#### (k) Differential diagnosis

- (1) A local lump in the midst of sector shaped granular induration
  - (a) Cyst : galactocoele or subareolar
  - (b) Cystic chronic interstitial mastitis
  - (c) Duct papilloma or carcinoma
  - (d) Fibro-adenoma
  - (e) Carcinoma
- (2) Irregular nodular lump of the breast
  - (a) Chronic local mastitis
  - (b) Fat necrosis
  - (c) Carcinoma.
- (3) Chronic mass in the breast
  - (a) Fat necrosis
  - (b) Chronic abscess

- (c) Chronic local mastitis
- (d) Tuberculoma
- (e) Gumma
- (f) Cyst (α) Mastitic  
(β) With mastitis
- (g) Fibro-adenoma
- (h) Duct papilloma
- (i) Carcinoma
- (4) Big swelling in the breast
  - (a) Soft or cystic fibro-adenoma
  - (b) Sarcoma
  - (c) Encephaloid or colloid carcinoma
- (5) Swelling of the whole of the breast
  - (a) Physiological turgidity
  - (b) Megalomastia
  - (c) Acute mastitis
  - (d) Mastitis carcinomatosa
  - (e) Elephantiasis of the breast.
- (6) Acute inflammatory or pseudo-inflammatory swellings
  - (a) Acute milk congestion
  - (b) Acute mastitis
  - (c) Mastitis carcinomatosa
  - (d) Filarial lymphangitis
  - (e) Sarcoma
- (7) Ulcers of the breast
  - (a) Chancre
  - (b) Paget's disease
  - (c) Tuberculous
  - (d) Gummatus
  - (e) Ulcerating new growth
    - (α) Carcinoma
    - (β) Cyst adenoma
    - (γ) Sarcoma
- (8) Peas and orange appearance in breast
  - (a) Carcinoma
  - (b) Fat necrosis
  - (c) Tuberculosis
  - (d) Gumma
  - (e) Chronic abscess
  - (f) Filariasis

#### (L) Miscellaneous

- (1) Venous obstruction is the most common cause of post operative oedema of the arm after radical excision of breast carcinoma.
- (2) Brawny arm causes
  - (a) Pre-operative malignant infiltration of venules & lymphatics

- (b) Post-operative (a) Excision of lymphatics  
 (b) Obstruction to vein

Venous oedema : soft pitting reacting

Lymph-oedema : persistent, brawny

- (3) If a tumour is detected in a woman of middle age whatever its situation, examine the breasts for carcinoma.
  - (4) Any localised bone complaint in a woman of middle age, exclude metastases from carcinoma breast.
  - (5) Every female ought to be taught to make a periodical examination of her breast after middle age and to report immediately to a medical man, in case a lump is detected, even if it be painless and non troublesome.
-

## CHAPTER VII

# THE ABDOMINAL WALL

### (1) CONGENITAL ABNORMALITIES

#### (1) EXOMPHALOS

**Def** Congenital defect of the closure of the anterior abdominal wall with non-retraction into the abdominal cavity of a part of the intestines, covered by the amnion.

- Varieties**
- (1) **Major** Absence of a considerable portion of anterior abdominal wall
  - (2) **Minor** Defect at the umbilicus only protrusion of the gut being confined to within the umbilical cord

**Clinic**

- (1) **Major** : Protruded mass of intra-abdominal contents, covered by a thin serous membrane merging at the margins of the defect, into normal muscular anterior abdominal wall

- (2) **Minor** Presence of a few coils of intestines into the foetal part of the umbilical cord

- Compl**
- (1) Incompatibility with life in major cases
  - (2) **Trauma** To the viscera at the time of ligature of the umbilical cord → faecal fistula
  - (3) **Sepsis**
  - (4) **Associated deformities**

**Treat** **Operative :**

#### (A) Major

- Tech**
- (1) Intra-abdominal accommodation of viscera
  - ↓ (2) Excision and freshening of defect margins
  - (3) Sutural reformation of
    - (a) Peritoneum
    - (b) Muscular wall

- Compl**
- (1) Non-accommodation of viscera
  - (2) Shock
  - (3) Stoppage of respiration

#### (B) Minor :

- Tech**
- (1) Reduction of intestinal coils
  - ↓ (2) Closure of the umbilical gap

## (2) EXTERNAL HERNIAS (See under Hernia)

- (a) Median (1) Epigastric  
 (2) Total devarication of the recti

(b) Umbilical

(c) Inguinal

(d) Femoral

## (II) TRAUMA

## (1) SUBCUTANEOUS

## (A) HÆMATOMA

(a) Subcutaneous

(b) Intra mural

(c) Retro-peritoneal

Etiology Run-overs

Path: Collection of blood in the loose extra peritoneal tissues of the posterior abdominal wall

Sites (a) Perinephric In rupture kidney

(b) Root of the mesentery

Clinic (1) Fullness with rigidity

(2) Discoloration late

Compl (1) Paralytic ileus

In mesenteric cases

(2) Extravasation of urine

In kidney cases

(3) Sepsis cellulitis, abscess

## (B) RUPTURE OF THE MUSCLE

Etiology (a) Outside trauma

(b) Strain

Compl Traumatic interstitial hernia

## (2) OPEN

## (A) PENETRATING INJURIES

Etiology (a) Stab wounds

(b) Bull gore

Path Depth and complications out of all proportions to the length and breadth

Clinic (1) Incised contused or lacerated wound

+ (2) With or without prolapse and injuries of internal viscera

Compl (1) Internal injuries

With (a) Prolapse

(b) Perforations

(c) Hemorrhage

(2) Sepsis (a) Superficial

(b) Peritoneal

(3) Sequela scar hernia

Treat Always explore Never probe  
 ↓ Debridement with or without drain

### (3) BURST ABDOMEN

Etio (1) Faulty sutures

- (a) Too thin sutures
- (b) Rapidly absorbable sutures
- (c) Continuous suture in the muscles and  
fascia of the abdominal wall

(2) Post-operative strain

- (a) Respiratory complications
- (b) Constipation or dysuria
- (c) Incomplete convalescence

(3) Sepsis of the operation wound

(4) Digestion of the operation wound  
 Access to pancreatic ferments

Clinic (1) Sudden Sudden burst open with immediate  
 prolapse of the abdominal viscera

(2) Gradual

(a) Interno-external

Burst-open of deeper layers  
 Skin being the last to give way

(b) Externo-internal

Giving way of superficial structures  
 Peritoneum being the last to give way

Compl Sepsis → peritonitis

Treat (1) First aid Protection of prolapsed viscera by  
 hot/sterile saline packs

(2) Deliberate

(a) Thorough cleansing of the prolapsed viscera

↓ (b) Reposition of the viscera

↓ (c) Resuture of the abdominal wall

## (III) INFECTIONS OF THE ABDOMINAL WALL:

### (1) CELLULITIS

Etio (A) External infection Traumatic, operative

(B) Extra-peritoneal infection

Extravasation of urine

(C) Peritoneal infection secondary to

(a) Peritonitis

(β) Fistulae

Path (1) Streptococcal from outside

(2) Gas gangrene from intestines

Clinic (a) Acutely spreading diffuse inflammatory  
 swelling of the abdominal wall

(b) Toxaemia

Compl (1) Sloughing and spreading gangrene

(2) Septicaemia

- Treat (1) Sulphonamide group  
 (2) Antisera  
 (3) Multiple incisions with hypertonic pack

## (2) ABSCESS

### (A) SUPERFICIAL Subcutaneous abscess

#### (I) Primary

Etio (1) Trauma

(b) Operation stitch abscess

Path Pyococcal infection round about a wound or a suture

Clinic (A) Local

(a) Tender point

↓ (b) Induration

↓ (c) Fluctuation

(B) General septic toxæmia

Compl Sinus formation

Treat Removal of the suture

Adequate drainage

#### (II) Secondary To deeper infection

(a) Peritoneal hepatic abscess

(b) Extra peritoneal perinephric abscess

(c) Muscular

#### (III) Specific

(a) Guinea worm abscess

(b) Bursting gumma

(c) Suppurating cold abscess

### (B) INTRA MUSCULAR ABSCESS

Etio (a) Primary

(1) Traumatic contusion  
 hæmatoma

(2) Pathological  
 pyæmic suppurating gumma

#### (b) Secondary

(1) Intra peritoneal suppuration  
 Hepatic abscess

(2) Bone suppuration  
 Ribs or vertebrae

Clinic (A) Acute Acute regional inflammation with rigidity of the whole of the particular muscle affected

(B) Chronic Localised non inflammatory swelling

Diff diag (1) From acute : Intra peritoneal suppurations

(2) From chronic Other localised swellings

(a) Intermuscular lipoma

(b) Gumma



**(C) EXTRA PERITONEAL ABSCESS**

**Def** Localised pus in extra peritoneal spaces

**Etio** (a) **Local sepsis**

(a) External penetrating wound

(β) Internal neighbouring viscera Kidney

(γ) Local suppurating haematoma

(b) **Pyæmic abscesses**

**Site** (1) **Perinephric**

(2) Peri ureteral

(3) Peri vesical

**Clinic** } (See under respective heads)

**Treat**

**(3) GANGRENE OF THE ABDOMINAL WALL**

**Etio** **Predisposers** (1) Debility

(2) Metabolic diseases

**Exciting** (1) **Specific Gas gangrene**

(2) **Non specific**

(a) **Septic**

(b) **Idiopathic**

**Path** Continuously and rapidly spreading diffuse gangrene of the abdominal wall

**Clinic** (1) Extensive sloughing with or without foul smell

(2) Bad general condition

**Treat** (1) Treat the etiology

(2) Support the vitality

(3) Antisera

(4) Minimum surgical interference

(a) Excision

(b) Cauterisation whole or marginal

(c) Removal of sloughs

↓ (5) Hypertonic baths or packs

**(4) SPECIFIC INFECTIONS ABDOMINAL WALL**

**(A) Syphilis muscular gumma**

**Clinic** (a) Non inflammatory induration

↓ (b) Inflammatory induration

↓ (c) Liquefaction

↓ (d) Ulceration

**(B) Tuberculosis**

(1) Secondary cold abscesses

(2) T. B. intestines → adhesions → fistulae

**(C) Actinomycosis**

**Sites** (1) Right iliac fossa

(2) Right hypochondrium

Path Secondary to (a) Caecum  
(b) Liver

(D) Guinea worm

(a) Subcutaneous abscess

(b) Subcutaneous calcification

#### (IV) NEOPLASMS OF THE ABDOMINAL WALL:

##### (1) LIPOMA

(a) Subcutaneous single or multiple

(b) Intermuscular diff diag from cold abscess

(n) Extra peritoneal etiology of ventral hernia

##### (2) FIBROMA

(A) Desmoid tumour

Etiology (a) Linea atropica of females

(b) Scars

Path Musculo-aponeurotic fibroma

Clinic Slow-growing localised hard → soft tumour

Compl (1) Recurrence: After removal

Recurrent fibroid of Paget

(2) Malignant degeneration Sarcoma

Clinic Rapid growth

Infiltration

Treat Complete excision

(B) Neuro-fibroma

Sites (a) Subcutaneous

(b) Retroperitoneal

Clinic Multiple, variable in size

Scattered along smaller nerves

##### (3) SARCOMA

(A) Muscular (a) Primary

(b) Secondary to desmoid tumour

(B) Retroperitoneal

Clinic Rapidly enlarging huge swelling fixed to the posterior abdominal wall with rapid cachexia and secondaries

##### (4) CARCINOMA

(A) Primary

Kangri cancer of Kashmir

Carcinoma in the chronic-burn scar of the epigastrium due to constant irritation of hot earthen bowl kept in for warmth

(B) Secondary

Infiltration from visceral carcinoma

#### (V) HERNIAS: CONGENITAL AND ACQUIRED

(See under Hernia)

**(VI) FISTULAE OF THE ABDOMINAL WALL**

<b>Varieties</b>	(1) <b>Gastric</b>	Acid reaction Skin irritation
	(2) <b>Biliary</b>	Alkaline reaction Skin irritation Yellowish colour
	(3) <b>Duodenal</b>	Alkaline reaction Skin irritation and digestion
	(4) <b>Faecal</b>	
	(A) High	fluid and irritating
	(B) Low	solid and non-irritating
<b>Causes</b>	(5) <b>Urinary</b>	Urinous smell
	(6) <b>Umbilical</b>	(See under Umbilicus)
	(1) <b>Infection</b>	Tuberculosis Actinomycosis Diverticulitis Regional enteritis
	(2) <b>New growths</b>	Carcinoma Sarcoma
	(3) <b>Distal obstructions:</b>	Urinary faecal
	(4) <b>Operative</b>	Stomies
<b>Clinic</b>	(5) <b>Congenital</b>	Patent omphalo mesenteric duct
	(6) <b>Trauma</b>	
	(1) <b>Position of the fistula-opening</b>	
	(2) <b>Discharge characters</b>	
	(a) Physical colour smell consistency	
	(b) Chemical reaction constituents	
<b>Compl</b>	(c) Microscopical	
	(3) <b>Effect on the surroundings</b>	
	Irritation digestion	
	(1) <b>Irritation dermatitis</b>	
	(2) <b>Digestion of the skin</b>	
<b>Treat</b>	(1) <b>Conservative</b>	
	(A) <b>Dressings</b>	
	(a) Emollient Vaseline liquid paraffin	
	+ (b) Anti-chemical	
	(a) Alkaline in acid fistulae	
	(β) Acid in alkaline fistulae	
	(B) <b>Lessen the discharge</b>	Diet and drugs
	(2) <b>Etiological</b>	
	(a) Removal of distal obstruction	
	(b) Short circuit	
	(3) <b>Local</b>	
	(a) Excision	
	↓ (b) Plastic closure	

**(VII) AFFECTIONS OF THE UMBILICUS:****(1) CONGENITAL AFFECTIONS**

- (A) **Exomphalos minor**
- (B) **Congenital hernia**
- (C) **Congenital sinuses or fistulae: omphalo-mesenteric**

**(2) INFLAMMATIONS**

- (A) **Infected umbilical cord**

- Compl
- (1) **Cellulitis**
  - (2) **Secondary hæmorrhage**
  - (3) **Tetanus**
  - (4) **Peritonitis**

- (B) **T B. Peritonitis**

Flat and chronically inflamed umbilicus

- (C) **Umbilical dermatitis**

Deep and unclean umbilicus

- (D) **Chancro of the umbilicus**

- (E) **Cholesteatoma** Umbilical calculus

**(3) FISTULÆ OF THE UMBILICUS**

- (A) **Fæcal**

- (a) **Patent omphalo-mesenteric duct**
- (b) **T B. intestines or regional enteritis**
- (c) **Carcinomatous infiltration**

- (B) **Urinary** Patent urachus

Etio Old age + urinary obstruction

Treat Removal of urinary obstruction

- (C) **Biliary**

- (D) **Gastric**

**(4) NEOPLASMS OF THE UMBILICUS**

- (A) **Adenoma**

Etio Patent omphalo-mesenteric duct

Path Arises in the omphalo-mesenteric remnant associated with Meckel's diverticular columnar epithelium

Clinic Raspberry like tumour with mucoid discharge

Treat Excision of the adenoma together with the omphalo-mesenteric duct

- (B) **Carcinoma**

- (a) **Primary**

- (b) **Secondary** from

(1) **Breast**

(2) **Stomach**

(3) **Liver**

(4) **Intestines**

- (C) **Melanoma**

**(5) UMBILICAL HERNIA (See under Hernia)****Varieties (A) Pathological**(1) **Non union of umbilicus**

Congenital hernia

(2) **Stretching of umbilicus**

Infantile hernia

(3) **Para-umbilical**

Adult hernia

**(B) Clinical**(1) **Juvenile**

(a) Congenital from birth

(b) Infantile some months after bu

(2) **Senile**

Adult para umbilical

**Compl (A) Juvenile ml****(B) Senile Irreducibility**

Incarceration

Strangulation

**Treat (A) Juvenile belt (upto 18 months only)****(B) Senile (1) Mayo****(2) Gallie****(6) CAPUT MEDUSÆ****Etio** Hepatic cirrhosis**Path** Venous obstruction**Clinic** Prominent peri-umbilical veins**(VIII) IMPORTANT POINTS**

- (1) Beware of careless handling of the umbilical cord
  - (a) Rigid asepsis
  - (b) Tight ligature
  - (c) Tie away from the umbilicus.
- (2) Expect paralytic ileus in retroperitoneal hematoma.
- (3) Always explore a penetrating injury of the abdominal wall  
it is worse than useless to probe it.
- (4) Injuries of the abdominal wall can be divided into
  - (a) Uncomplicated
  - (b) Complicated with visceral injuries.
- (5) Penetrating injuries of the abdominal wall
  - (a) Extra peritoneal
  - (b) Trans-peritoneal
    - (1) Without visceral affection
    - (2) With visceral affection
      - (1) Prolapse
      - (2) Perforation
      - (3) Trauma with hemorrhage

- (6) Never put continuous sutures in the extra peritoneal abdominal wall if you want to avoid burst-abdomen.
- (7) Expect burst-abdomen in
  - (a) Operations on upper abdominal viscera  
Contact with digestive ferments
  - (b) Post-operative straining cough
  - (c) Sepsis
  - (d) Continuous sutures.
- (8) Complications of operative wounds of the abdominal wall
  - (a) Serum collection
  - (b) Hematoma
  - (c) Stitch abscess
  - (d) Subcutaneous abscess
  - (e) Deep abscess
  - (f) Cellulitis
  - (g) Spreading gangrene.
  - (h) Burst-abdomen
- (9) Sequelæ of operative wounds of the abdominal wall
  - (1) Keloid
  - (2) Scar hernia
  - (3) Internal adhesions
  - (4) Sinuses or fistulæ
- (10) Most common cause of abdominal wall cellulitis is extravasation of urine. The cellulitis can be in two planes
 

<ol style="list-style-type: none"> <li>(a) Subcutaneous</li> <li>(b) Submuscular</li> <li>Extra peritoneal</li> </ol>	}	Rupture of external urethra Rupture of internal urethra anterior wall of bladder ureters kidneys.
---	---	---
- (11) Post-operative non healing sinus of the abdominal wall
  - (a) ? Retained septic suture
  - (b) ? Specific infection
  - (c) ? Non-healing cavity
  - (d) ? Adhesion to bone.
- (12) Abscess in the abdominal wall think of
  - (1) Pointing deep abscess
    - (a) Hepatic
    - (b) Appendicular
    - (c) Subdiaphragmatic
    - (d) Perinephric
  - (2) Suppurating gunma
  - (3) Cold abscess
  - (4) Guinea-worm abscess.
- (13) Peritoneal abscess rigidity is regional  
Muscular abscess rigidity is muscular  
In the first case, rigidity is confined to the overlying region, irrespective of the muscles involved in the latter case rigidity is confined to the particular muscle involved from its origin to its insertion whatever the position of the abscess

- (14) Most common non-inflammatory localised swellings to be differentially diagnosed from one another in the abdominal wall are
- (a) Cold abscess
  - (b) Lipoma or soft fibroma
  - (c) Liquefying gumma
  - (d) Guinea worm abscess.
- (15) Any indurated swelling in a muscle with or without inflammation ? Gumma  
Try pot. iodide in heavy doses.
- (16) Fibroma which recurs : recurrent desmoid tumour of Paget.
- (17) Multiple small localised tumours in the abdominal wall  
? Neurofibromatosis  
? Multiple lipomata.
- (18) Localised induration in the abdominal wall
- (a) ? Tuberculosis : adhesion → fistula
  - (b) ? Gumma
  - (c) ? Malignant infiltration
  - (d) ? Deep abscess : coming to a head.
- (19) Take care of the surrounding skin in a fistula of the abdominal wall : higher the fistula, more is the irritation.
- (20) Emollient and anti-chemical dressings + regulation of the discharge by modification in the intake and by medical treatment is the conservative treatment of fistulae of the abdominal wall.
- (21) Flat umbilicus  
Think of T. B. peritonitis  
Deep umbilicus  
Think of Meckel's diverticulum.
-

# CHAPTER VIII

## THE UPPER EXTREMITY

### (A) THE HAND

#### (1) CONGENITAL AFFECTIONS

##### (1) POLYDACTYLISM

Def An extra digit or portion of a digit

Path (a) An additional digit joined to normal digit by

(1) Fibrous tissue

(2) Articulation with

(a) Metacarpal

(β) Carpal

(b) Bifid terminal phalanx

Treat (1) Amputation

(2) Excision of the phalanx which is

(a) Smaller

(b) Divergent

(c) With a bad nail

##### (2) SYNDACTYLISM

Def Webbed finger

Treat Operative

Time At the age of three years

Pre-oper \ Ray plate

Tech

(A) First stage  
of  
web separation

- |   |                                      |
|---|--------------------------------------|
| { | (1) Basal ear ring perforation       |
|   | ↓ Lateral sutures                    |
|   | (2) Agnew                            |
|   | Large single, dorsal flap            |
| { | (3) Norton                           |
|   | Small triangular dorso-ventral flaps |

↓ (B) Second stage (4) Didot Palmar and dorsal longitudinal flaps

(3) MACRODACTYLY Enormous overgrowth of a finger

(4) CONGENITAL CONTRACTURE Little finger

Path Contracture of the central slip of palmar fascia

Clinic (a) Metacarpo-phalangeal hyper-extension

(b) Flexion at both the inter phalangeal joints



- Diff diag (1) Dupuytren's contracture  
 (2) Contracture of the tendon  
 (3) Mal-ankylosis of joints  
 (4) Contracted skin scars

Treat . Excision of the central fascial slip

## (II) TRAUMA

- Etio (1) **Crush injuries** Machines  
 (2) **Incised wounds** Glass, stabs  
 (3) **Lacerated wounds** Machines  
 (A) Skinned or degloved hand  
 (B) Severance of fingers or portions of hand  
 (4) **Punctured wounds** Pricks, bites

Path Injuries to

- (1) Nail bed . avulsion  
 (2) Tendons rupture, avulsion division  
 (3) Bones fracture  
 (4) Joints laceration dislocation  
 (5) Vessels palmar hæmorrhage  
 (6) Nerves division rupture  
 (7) Fingers separation  
 (8) Skin laceration degloving  
 (9) Foreign bodies needles, thorns, glass, etc.

- Compl (1) **Hæmorrhage**  
 (2) **Infection** → suppuration → sloughing  
 (3) **Gangrene**  
 (4) Retention of foreign bodies  
 (5) **Adhesions and contractures**  
 (6) **Tetanus** gas gangrene

Treatment

- (1) General anaesthesia  
 (2) Tourniquet  
 (3) Thorough exposure  
 (4) **Debridement**  
 Excise only dead or grossly contaminated tissues (leave the nerves & important vessels)  
 (5) **Control of hæmorrhage**  
 Sources (a) Superficial palmar arch  
 (b) Deep palmar arch  
 (c) Ant. and post. carpal arches  
 (d) Comes nervi mediani  
 (e) Digital arteries  
 Treat (A) Temporary  
 (a) Direct pressure  
 (b) Tourniquet  
 (B) Conservative  
 Local graduated pressure

## (C) Operative

(a) Ligature both ends

↓ (b) Ligature of brachial art.

Ind (a) Failure of local treat

(β) Sepsis with secondary  
hemorrhage

## (6) Treatment of special conditions

## (A) Punctured wounds

(1) Immediate squeezing of drops of  
blood (least three)

(2) Cleansing or carbolicisation

(3) Sterile dressings

(4) Immobilisation of the arm in a  
slings—till bed time

(5) Seek surgical advice

if Pain, throbbing swelling or tender  
ness next morning(6) Immediate antiserum and sulpho-  
namide therapy If prick is septic

## Bite wounds

(1) Electric cauterisation

(2) Excision in toto

(3) Tetanus anti toxin if horse or cat bite

Anti rabie treatment if dog bite

Arsenic if rat bite

## (B) Lacerated wounds

(1) Debridement remove only the dead  
or grossly infected tissue

(2) Repair

(3) Pedicle grafting after sepsis is nil

(a) Skinned or degloved hand

(1) If skin is attached

(a) Excision of only actually  
dead tissues

↓ (β) Flavine or mercurio-chrome

↓ (γ) Replacement of skin

↓ (δ) Rubber tissue drainage

(2) If skin is lost

(a) Thorough cleansing

(β) Implantation of the hand  
into a subcutaneous  
tunnel in the thigh

**(b) Complete or incomplete severance of a digit****(1) Replacement and suture****(2) Excision**

Ind (a) Already dead

(b) 48 hours after replacement

If (a) Place in lifeless

(b) Infection at suture

**(c) Button-hole extensor expansion:**

Etiol Direct trauma

Muscular violence

Path Rupture of central band of extensor

+ Protrusion of the head of the first phalanx

Clinic (a) Swollen proximal interphalangeal joint

(b) Flexion of first phalangeal joint

+ Extension of second phalangeal joint

Treat Immediate exposure and repair

After-treat Fixation

By plaster cast

In full extension

For four weeks

**(C) Incised wounds Cut wrist****(1) Application of rubber tubing tightly from below elbow downwards upto the lower third of the forearm****(2) Explore****(1) Identify the divided structures**

(a) Arteries ligature

↓ (b) Nerves suture

↓ (c) Tendons (a) Suture

or (b) Tendon transplant

**(3a) Methods of identification of tendons**

(a) Active movements by the patient

or (b) Following the muscle bellies  
(through a higher incision)**(4) Suture the tendons and nerves****(D) Foreign bodies Needles****(1) X Ray in two planes**or **(2) Screen in two planes and mark the position by gentian violet****(3) Local or general full anaesthesia**

(4) **Incise**

- (a) At right angles to the needle
- (b) Parallel to tendons and nerves
- (c) As near the needle as possible
- (d) Feel by forceps or finger tip
- (e) Avoid injury to structures

(7) **Primary amputation** For trauma to the hand  
Exceptional indications

- (a) Mangling and pulping out of shape
- (b) Extensive laceration + pulped bones

**Post-operative treat**

- Fixation of the wrist
- By Plaster of Paris
- In Position of relaxation of sutured tissues
- For 10-15 days

**(III) INFECTIONS OF THE HAND****(1) ACUTE INFECTIONS OF THE HAND****(A) NAIL INFECTIONS****(1) Onychia**

Def Acute inflammation and suppuration of nail bed

Ftio Crush fingers

**Pricks under nails**Clinic (a) Acute pain and tenderness  
↓ (b) Yellow discoloration under the nailCompl (1) Death of the nail  
(2) **Ascending lymphangitis**  
(3) Chronic onychia and paronychiaTreat (1) Heat and Bier  
↓ (2) **Removal of the nail**  
↓ (3) Hypertonic → emollient applications**(2) Paronychia**

Def Inflammation and suppuration of nail base

Etio Infected hang-nail

Clinic (1) Acute inflammation around the nail base  
↓ (2) Suppuration (a) Around the nail  
(b) Under the proximal nailCompl (1) Death of the nail  
(2) **Ascending lymphangitis**Treat (1) Prophylactic excision and iodisation of an  
hang nail  
(2) Conservative heat and Bier

## (3) Operative

(a) Lateral incisions with turning back of basal flap

+ (b) Excision of the proximal half of the nail  
If required

## (4) Post-operative

(a) Hypertonic pack or baths 48 hours

↓ (b) Sterile paraffin pack

+ (c) Sling

**(B) SUBCUTANEOUS INFECTIONS**

(1) Boils On the dorsum

(2) Carbuncles Rare

(3) Infected wart or corn

(4) Subcuticular whitlow

Etio Infection and suppuration of friction vesicles

Clinic Pus under the cuticle

Compl Ascending lymphangitis

Treat Snip off the cutis

↓ Dry dressings with spirit

## (5) Subcutaneous whitlow

Etio Infected wart or corn

Boils

Path Abscess in the subcutaneous tissues

Clinic Swollen inflamed finger with no fluctuation

Treat Lateral incisions

Rubber dam drainage

Hypertonic dressings

## (6) Superficial cellulitis

Etio Superficial septic abrasion

Path Infection by streptococcus

↓ Ascending diffuse cellulitis and lymphangitis

Clinic Diffuse ascending inflammation

General toxæmia

Compl (1) Ascending lymphangitis or cellulitis

(2) Septicæmia

Treat Conservative (1) Heat and Bier

(2) Sulphonamide and antisera

**(C) FASCIAL SPACE INFECTIONS**

## (1) Terminal pulp infection

Def Infective inflammation → suppuration in the cellular tissues of the pulp of the ungual phalanx from the tip to the level of the epiphyseal line of terminal phalanx base

Etio Needle or thorn pricks cuts crushes, foreign bodies

Path Infection → inflammation → suppuration

(a) Central (a) Superficial

(3) Deep

- (b) Lateral  
 (c) Terminal near the tip  
 (d) Total whole space
- Clinic (a) Throbbing pain  
 (b) Tenderness  
 (c) Swelling  
 (d) **Movements of the finger not affected** } of the finger pulp
- Compl (1) **Lymphangitis** → general complications  
 (2) **Osteomyelitis** → necrosis of the phalanx  
 (3) **Tenosynovitis**  
 (4) **Onychia** → death of the nail  
 (5) Deformed tender finger end
- Treat (1) Heat and Bier with rest in sling  
 ↓ (2) **Pulp-split or lateral incision**  
       **Only upto 5 distal to terminal crease**  
 ↓ (3) **Glove drain**  
 ↓ (4) **Hypertonic packs or baths with Bier**  
 ↓ (5) **Sequestrotomy or curettage**  
       **If necrosis of the phalanx**

## (2) **Thenar space infection**

Def · Infective inflammation of the fascial space at the root of the thumb

- Eti (a) Punctured wound  
 (b) Ruptured **tenosynovitis** : Index and thumb

- Clinic (1) Inflammatory painful tender swelling of the thenar eminence  
 (2) **Thumb movements relatively unaffected**

- Treat (1) Heat and Bier  
 ↓ (2) **Incision and evacuation**  
       (a) **Incise radial side dorsum of the second metacarpal**  
       (b) **Hilton's method**  
       (c) **Drainage of** (a) **Fascial compartment**  
                           (b) **Affected tendon sheath**  
       (d) **Save radial art.**

## (3) **Middle Palmar space infection** **With lumbrical canals**

Def Suppuration in the mid palmar fascial space and the lumbrical canals

- Eti (a) Penetrating wounds or pricks  
 (b) **Tenosynovitis** : Medial three  
 (c) **Osteomyelitis of the metacarpals**

- Clinic (1) **Obliteration of the palmar hollow**  
 ↓ (2) **Swelling of the finger webs**  
 (3) **Extensive swelling of the dorsum**

- Treat** (1) Heat and Bier with rest  
 ↓ (2) Incision and evacuation  
 (A) (a) Incise between metacarpals  
           split the finger webs  
       ↓ (b) Hilton's method  
       ↓ (c) Drainage of  
             (a) Fascial compartment  
             (β) Affected tendon sheath  
 (B) Henry's drainage  
       (a) Incision cuneiform → ulnar border  
             of fifth metacarpal  
       (b) Retraction forwards of abductor quinti  
       (γ) Division of opponens quinti  
       (d) Drainage

**Point** Take care of ulnar nerve and artery

- Adv** (1) Good drainage  
 (2) Scar not in pressure area

(4) Pronator space infection

- Def** Suppuration between  
 (a) Pronator quadratus with bones  
 and (b) Flexor tendons

**Etio** Extension from the palmar infection

- Clinic** (1) Inflammatory swelling on the volar aspect  
 (2) Wrist joint fixed in flexion  
 (3) Hourglass swelling

- Treat** Incision and evacuation  
 (a) Incise 2 along the inner side of the ulna  
           starting 1.5 above the ulnar tip  
 (b) Hilton between ulna and flexor tendons  
 (γ) Counter incision on lateral side  
 (d) Drainage (a) Medial and lateral  
               (β) Affected tendon sheaths

#### (D) TENDON SHEATH INFECTIONS

- Syn** (1) Thecal whitlow  
 (2) Suppurative tenosynovitis

**Def** Infective inflammation → suppuration → sloughing  
 of the flexor tendon sheaths

- Etio** (1) Trauma  
       (a) Punctured wound 50 %  
       (b) Lacerated wound of flexor crease  
 (2) Pulp infection and faulty incision for it  
       Too proximal incision  
 (3) Osteomyelitis terminal phalanx

**Site** First three fingers of the right hand

- Clinic** (1) Exquisite tenderness over the linear tendon  
 (2) Flexion-spasm of the finger

- (3) **Exquisite pain on passive extension**
- (4) **Painful active movements**
- (5) **Swelling**
  - (a) Along the linear tendon
  - (b) Fullness below the annular ligament  
In radial or ulnar bursitis
  - (c) Hourglass swelling  
If forearm pronator space affected

- Diff. diag**
- (1) **Fascial space infection**
    - (a) Swelling more marked
    - (b) Movements less affected
    - (c) Tenderness and pain less
  - (2) **Tenosynovitis**
    - (a) Swelling less marked
    - (b) Movements more affected
    - (c) Pain, tenderness and spasticity +
  - (3) **Lymphangitis**
    - (a) Insignificant primary focus
    - (b) Red streaks
    - (c) Superficial rapidly ascending
    - (d) Tender glands
    - (e) General toxæmia
  - (4) **Osteomyelitis**
    - (a) Affection of the whole circumference
    - (b) Signs within the confines of the bone
    - (c) Subacute or chronic course with sinus

- Compl:**
- (1) **Extension:**
    - (A) **Tendons**
      - (a) Little finger → ulnar bursa
      - (b) Thumb → radial bursa
    - (B) **Fascial spaces**
      - (a) Ring and middle fingers  
↓ Mid palmar space
      - (b) Index finger → thenar space
      - (c) Ulnar or radial bursæ  
↓ Pronator space
    - (C) **Bones Osteomyelitis**
  - (2) **Sloughing** Of the tendons
  - (3) **Adhesions and contractures**

- Treat**
- (1) **Pre-operative** Heat  
Bier  
Elevation with rest  
General sulphonamides
  - (2) **Operative** Early incision and evacuation
- Tech**
- (a) General anaesthesia
  - (b) Tourniquet



## (c) Incisions

## (a) Fingers

Ant. lateral on either side of  
the phalanx avoiding joints

## (β) Radial bursa

Antero-lateral on the thumb

↓ Thenar eminence

↓ Upto 1 distal to annular lig.

## (γ) Ulnar bursa

Radial side of hypothenar

↓ Through the annular lig

## (δ) If fascial spaces infected

Carry the incisions into them

## (d) Avoid nerves, vessels, bones, joints

## (3) Post-operative

## (A) Immediate

## (a) Mag. sulph.-glycerine pack

## (b) Fixation

By Plaster splint

In Physiological position

For 48 hours

## (B) After 48 hours

## (a) Hypertonic baths and packs

## (b) Active movements

## (c) Rest in physiological position

Splint and sling

## (d) Bier's hypersemia

## (C) General chemo-therapeutic measures

Sulphanilamides

## (E) PHALANGEAL WHITLOW

Phalangeal osteomyelitis and necrosis

Def Pyogenic osteoperiostitis of phalanges

Etio (1) Secondary

To every other form of hand infection

(2) Primary traumatic infection

specific with secondary infection

Clinic (1) Primary focus in secondary cases

(2) Subacute or chronic intractable course

(3) Affection of the whole circumference

(4) Presence of sinuses

Treat (1) Curettage

(2) Excision

(3) Amputation avoid as far as possible



- Treat (A) Conservative  
 (1) Bier's hyperaemia  
 (2) Plaster-of Paris with Winnet Orr
- (B) Operative  
 (1) Incision  
     1.5 above the annular ligament  
     ↓ Level of superficial palmar arch  
 ↓ (2) Curettage  
 or (2) Excision of all affected material  
 ↓ (3) BIPP
- (C) Post-operative  
 (1) Cock up splint or Plaster-of Paris  
 (2) Bier's hyperaemia  
 (3) Active movements  
 (4) General treatment
- (c) Tuberculous dactylitis (See under Bones)
- (d) Tuberculous onychia  
 Indolent ulcer with shed nail

## (2) SYPHILITIC MANIFESTATIONS

- (a) Syphilitic onychia ;
- (a) Primary chancre ;  
 (a) Chronic indolent ulcer  
 + (b) Enlarged regional glands  
 (c) W. R.  
 (d) Therapeutic test
- (β) Secondary onychia and paronychia ;  
 (a) Dry, brittle nails  
 (b) Thick, red fissures around the nails
- (γ) Congenital syphilitic onychia  
 (a) Sero-pus under nail  
 ↓ (b) Shed nail
- (b) Syphilitic Tenosynovitis  
 Indolent, painless serous
- (c) Syphilitic dactylitis (See under Bones)

## (3) GONORRHOEAL TENOSYNOVITIS Rare

- Clinic (1) Subacute tenosynovitis  
 (2) Urethral discharge or history of gonorrhoea

Compl Adhesions and contractures

Treat Early mobilisation

## (IV) GANGRENE OF THE HAND (See under Gangrene)

### (A) CIRCULATORY

- (1) Impaired general circulation  
 (2) Thrombosis  
 (3) Embolism

- (4) Ligations
- (5) Pressure on main artery    Around elbow
  - (a) Traumatic fractures dislocations hæmatomas
  - (b) Therapeutic tight bandages splints, plasters
- (6) Injury to the main artery
  - Indirect traumatic gangrene
- (7) Senile
- (8) Thrombo-angitis obliterans
- (9) Raynaud Vasospasm

**(B) NEUROGENIC**

- Trophic ulcers**    (a) Leprosy  
                               (b) Paralysis    bed sores  
                               (c) Central nervous diseases

**(C) INFECTIVE**

- (1) Acute inflammations    Sloughing tendons
- (2) Anaerobic infection

**(D) DIRECT TRAUMATIC**    Crushes, pulpung

**(E) PHYSICAL AND CHEMICAL**

- (1) Burns
- (2) Frost bite
- (3) Escharotics    carbolic acid tinct. iodine
- (4) Scorpion bite    In some cases

**(F) DIABETIC**

**(V) NEW GROWTHS OF THE HAND :**

- (1) Warts and corns    (See under Skin)  
                               Molluscum contagiosum
- (2) Cystic swellings
  - (A) Post-traumatic epidermoid cyst
    - Syn    Implantation cyst or dermoid
    - Etio    Trauma    pricks
    - Path    Lined by squamous epithelium
    - Clinic    Rapidly enlarging subcutaneous cysts on the  
                               palmar aspect of hand and fingers
    - Treat    Excision
  - (B) Ganglion    (See under Muscles and Tendons)
  - (C) Pseudo-bursa
    - Def    An adventitious bursa overlying an undue  
                               prominence of a bone
    - Site    Base of 2nd or 3rd metacarpal (on the dorsum)
- (3) Exostoses
  - Sites    Bases of 2nd or 3rd metacarpals
  - Compl    Adventitious bursitis
- (4) Enchondroma    Multiple    (See under Bones)
- (5) Fibroma

- (6) **Lipoma** (a) Under the palmar fascia  
 (b) Macroductyly
- (7) **Sarcoma** From the skin or metacarpal bone
- (8) **Melanoma** Melanotic whitlow  
 Near about the nail.

## (VI) DEFORMITIES OF THE HAND:

### (A) CONGENITAL (See above)

- (1) **Polydactylism**
- (2) **Syndactylism**
- (3) **Macroductylism**
- (4) **Congenital contracture** Of little finger

### (B) ACQUIRED

- (1) **Dupuytren's contracture:**  
 (See under Muscles and Tendons)
- (2) **Volkman's ischæmic contracture**  
 (See under Muscles and Tendons)
- (3) **Main-en-griffe** } claw hand—ape hand  
 ↓ **Main-en-singe** }  
 (See under Nerves)

**Etio** (a) **Ulnar nerve paralysis**  
 (b) **Paralysed ulnar + median**

- Clinic** (1) **Flat palm** With prominent bones  
 (a) **Thenar atrophy**  
 + (b) **Hypothenar atrophy**
- (2) **Deformity**  
 (a) **Metacarpo-phalangeal hyperextension**  
 + (b) **Inter phalangeal flexion**
- (4) **Mallet or baseball finger**  
 (See under Muscles and Tendons)

#### (5) **Trigger finger**

**Etio** **Sprain**

- Path** (1) **Stenosing tendo-vaginitis**  
 (2) **Rupture middle slip of extensor**  
 (3) **Extensor sheath affection**  
 (a) **Ganglion**  
 (b) **Sesamoid**  
 (c) **New growth**  
 (d) **Osteo-arthritis**

- Clinic** (1) **Flexion with inability of voluntary active extension**  
 (2) **Passive extension with a snap**

- Treat** (1) **Removal of etiology**  
 (2) **Division of thickened tendon sheath**

**(B) PAIN IN THE UPPER EXTREMITY****(1) PAIN IN THE SHOULDER****(A) DIRECT CAUSES**

- (1) **Trauma To**
  - (a) Joints
    - (α) Sprain
    - (β) Synovitis
    - (γ) Adhesions
  - (b) Muscles and tendons rupture
    - (α) Supraspinatus
    - (β) Biceps
  - (c) Bones fracture
- (2) **Arthritis**
  - (a) Traumatic
  - (b) Infective
  - (c) Specific
  - (d) Osteo-arthritis
- (3) **Fibrositis and fascitis**
  - (a) Rheumatic
  - (b) Gonorrhoeal
- (4) **Myositis**
  - (a) Infective
  - (b) Rheumatic
- (5) **Bursitis** Sub-acromial sub-deltoid
- (6) **Neuritis**
- (7) **Occupational**

**(B) REFERRED CAUSES**

- (1) **Cardio-vascular lesions** Angina pectoris
- (2) **Intra-thoracic lesions** Pleural affections  
New growths
- (3) **Gastric lesions** Flatulence  
Gastric ulcer or cancer
- (4) **Duodenal lesions** Catarrh  
Ulcer
- (5) **Hepatic lesions** Hepatic engorgement  
Hepatitis or hepatic abscess
- (6) **Gall bladder lesions** Cholecystitis  
Cholelithiasis
- (7) **Pancreatic lesions** Chronic pancreatitis  
Carcinoma pancreas  
Pancreatic cyst
- (8) **Diaphragmatic lesions**  
Subdiaphragmatic abscess  
Hepatic, splenic or pleural adhesions
- (9) **Nervous lesions**
  - (a) Spinal
    - (α) Caries
    - (β) Growth
    - (γ) Pachymeningitis
  - (b) Cervico-brachial neuralgia

## (2) PAIN IN THE UPPER LIMB

## (1) Brachial neuralgia

- Etiology (a) Rheumatic  
 (b) Gouty  
 (c) Influenzal  
 (d) Malarial  
 (e) Alcoholic  
 (f) Diabetic

- Clinic (1) Pain and tenderness in the distribution of the brachial plexus  
 (2) No muscular paralysis or atrophy  
 (3) No sensory loss  
 (4) No reflex cause

## (2) Brachial neuritis

- Etiology Pressure on or irritation of nerve trunks  
 Due to (a) Tumour or glands in the neck  
 (b) Cervical rib  
 (c) Subclavian aneurysm  
 (d) Tumour or glands in the axilla

- Clinic (1) Pain and tenderness  
 (2) Muscular paresis and atrophy  
 (3) Sensory loss  
 (4) Presence of some causative focus

## (3) Radicular pain 5C to 2D

- Etiology (1) Spinal affections  
 (a) Gliosis  
 (b) Tumour  
 (c) Pachymeningitis  
 (2) Vertebral affections  
 (a) Trauma  
 (b) Caries  
 (c) New growth  
 (3) Herpes zoster

- Clinic (1) Deformity rigidity and tenderness of vertebra  
 (2) Other root symptoms paralysis  
 root pains  
 loss of tendon reflex  
 (3) Spinal pressure symptoms spastic paraplegia  
 (4) Oculo-pupillary phenomena 8C + 1D  
 (5) X Ray  
 (6) Lumbar puncture

(1) Neurogenic growths

## (5) Occupation neuroses

Etiol. Certain occupations

Writing typing needlework telegraphy hair cutting

Clinic Painful cramps with history of occupation

## (6) Referred visceral pain

(1) Heart angina pectoris

(2) Aorta aneurysm

## (7) Tabetic crises

## (C) DEFORMITIES OF THE UPPER EXTREMITY

## (1) SPRENGEL'S SHOULDER

Def Congenital elevation and rotation of scapula

Etiol. ? Intra-uterine compression

Clinic (1) Short neck

(2) Scapula above the level of the clavicle

(3) Limitation of arm movements

Treat Conservative

(a) Massage exercises

↓ (b) Correction → plaster fixation → physiotherapy

## (2) CUBITUS VALGUS

Def Increase in the normal carrying angle of the elbow

Anat Normal carrying angle

Males 13°

Females 15°

Etiol. Elbow injuries

(1) Separation of lower humeral epiphysis

(2) Fracture lower third of the humerus

(3) Supra-condylar or T fracture

(4) Fracture either condyle

(5) Osteomyelitis humerus

Clinic Exaggerated lateral deviation of the forearm from the axis of the arm

Compl Tardy ulnar neuritis

Treat (1) Anterior transposition of ulnar nerve

(2) Supra-condylar humeral osteotomy

## (3) CUBITUS VARUS

Def Diminution in the normal carrying angle of the elbow

Etiol. Elbow injuries same as valgus

Clinic Forearm more in line with the arm

## (4) CLUB HAND

Def Congenital absence of radius with forward and radial displacement of the hand



Clinic	Deformity of the hand
Treat	(1) Repeated manipulations → plaster fixations
	(2) Bone-graft
	(3) Ulna split

(5) DEFORMITIES OF THE HAND (See under Hand)

## IMPORTANT POINTS

### (A) Trauma

#### (1) Punctured wounds

##### (1) Complications

- (a) Retention of foreign bodies needles
- (b) Infection septic pricks
- (c) Hæmorrhage
- (d) Anaerobic infections

##### (2) Treat (a) Immediate squeezing

Of three drops of blood

- (b) Prophylactic anti serum + sulphonamide
- (c) Local rest

#### (2) Needle in the palm

- (a) Never attempt to remove a needle from the palm under short anaesthesia. Local or general anaesthesia for quite a long time is usually required.
- (b) Never be in a hurry while searching for the foreign body it will only make a mess of the operation.
- (c) Either mark the position of the needle under screen or take X Ray plates in two planes before every operation for removal of a needle.
- (d) Incise across the long axis of the needle and not parallel to it.
- (e) Tip of the small finger is the best feeler for a needle blunt dissection forceps is the next best.
- (f) A fibrous cord or a deep ligature may give a false sensation of a foreign body

#### (3) Wrist cut

- (a) It is impossible to divide the flexor tendons by a transverse cut just above the wrist without dividing the median nerve or the ulnar nerve.
- (b) Even if both the median and ulnar nerves are divided at the wrist, fingers can be flexed if tendons are intact.
- (c) Hand should in all cases be tested for sensations and movements of individual tendons, after every open wound of the wrist especially on the flexor side.

#### (4) Hæmorrhage

Uncontrollable hæmorrhage from below the wrist is best treated by ligature of brachial artery Ligatures of radial and ulnar combined are not sufficient.

**(5) Sequelae**

Anchoring adhesions within tendon sheaths are one of the chief causes of disability following hand injuries and the best method of preventing them is gentle technic + early mobility

- (6) We should regard all but the most trivial injuries of the hand and fingers as major surgical emergencies calling for expert treatment. Kanavel would rather have the average surgeon operate on him for acute appendicitis than for the repair of a divided flexor tendon.

**(B) Infection****(1) Main classification of hand infections****(1) Minor**

- (a) Onychia and paronychia
- (b) Subcuticular whitlow
- (c) Subcutaneous whitlow
- (d) Minor lymphangitis

**(2) Major**

- (a) Tenosynovitis
- (b) Fascial and bursal infections
- (c) Osteomyelitis
- (d) Lymphangitis
- (e) Cellulitis

- (2) In hand infections point of maximum tenderness is a guide to the maximum concentration of pus and to the compartment affected.

- (3) Swelling on the dorsum Of the hand in cases of hand infections is nearly always due to secondary oedema and only very rarely requires incisions.

**(4) Chief diagnostic points Of different hand infections****(1) Fascial space infection**

- (a) Swelling +
- (b) Spasm and immobility of tendons —

**(2) Tenosynovitis**

- (a) Swelling —
- (b) Spasm and immobility of tendons +

**(3) Lymphangitis**

- (a) Ascending superficial swelling with red streaks
- (b) Spasm and immobility of tendons —

**(5) Treatment points In different hand infections**

- (1) Fascial space infection Choose your own time
- (2) Tenosynovitis Drain at the earliest opportunity
- (3) Lymphangitis Never operate.

**(6) In pulp space infection The chief complications are**

- (a) Osteomyelitis and necrosis of ungual phalanx
- (b) Tenosynovitis

These complications can be avoided by correct methods of drainage at the correct time. Drainage must be early do not wait for fluctuation.

(7) **Acute suppurative tenosynovitis**

- Etiology** (a) Punctured wounds  
 (b) Terminal pulp infection with its faulty treatment
- Complications** (a) Tendon necrosis  
 (b) Fascial space suppuration  
 (c) Bone necrosis

Common infective agent is streptococcus haemolyticus. Most important cause of poor results is delay before operation.

(8) **Tendon sheath infections**

- Clinic** (1) Uniform linear swelling of the whole finger  
 (2) Exquisite tenderness over the line of tendon  
 (3) Flexion of the finger  
 (4) Extremely painful passive extension

(9) **Infection of the sheaths of the thumb and the little finger** is much more dangerous than the infection of other finger sheaths, due to the continuity with common ulnar and radial bursae of the former sheaths.

(10) **Differential diagnosis between Pulp abscess and lymphangitis**

	<i>Pulp abscess</i>	<i>Lymphangitis</i>
Throbbing	+	—
Swelling	+	—
Tenderness	+	—
Red lines	—	+
Toxaemia	—	+

(11) **Obliteration of palmar hollow is pathognomonic of middle palmar space infection.**

(12) **Hourglass swelling with flexion-spasm of the wrist is pathognomonic of compound palmar bursitis with pronator space infection.**

(13) **Pre and post operative treatment in hand infections**

- (A) **Pre-operative**  
 (a) Bier's hyperaemia  
 (b) General anaesthesia  
 (c) Tourniquet
- (B) **Post-operative**  
 (a) Bier's hyperaemia

## (b) Hypertonic dressings

Baths Hypertonic saline or mag sulph

Packs Mag. sulph-glycerine

(c) Rest by plaster or wooden splint and a sling  
in physiological wrist position.  
(cricket ball-grasp)

## (d) Early active movements.

(14) Beware of secondary hæmorrhage in hand infections and their treatment.

(15) Avoid hot moist dressings in hand infections.

(16) Most common causes of gangrene finger are

(a) Trauma round about elbow and its treatment

(b) Pulping of the hand direct traumatic

(c) Acute infective gangrene

(d) Trophic gangrene leprosy

(e) Scorpion bite (author has seen three cases of dry prolonged gangrene)

(f) Raynaud

(g) Diabetes

(17) Chronic bone affections in hand

(1) Chronic septic necrosis

(2) T. B. dactylitis

(3) Syphilitic dactylitis.

## (C) Operations on hand :

(1) Conservative surgery is the best surgery in hand.

(2) Thumb is the most important finger and utmost conservatism should be followed in thumb surgery

(3) A hand without a thumb lacks about half its usefulness. A hand without a thumb and an index finger lacks most of its usefulness. Loss of distal tip of any finger is a lamentable loss to skilled workers. A single finger or adequately functioning stump thereof is considerably better than any artificial hand.

(4) Amputation of a single finger with the metacarpal head is preferable to amputating a large portion of the finger

(5) Loss of metacarpal head does not seriously weaken the hand and produces less deformity

(6) Painful stumps after digital amputations are usually due to amputation neuromata of the digital nerves

Diff. diag of painful stumps

(1) Amputation neuroma

(2) Amputation osteitis

(3) Traumatic neuroma

Treatment of amputation neuroma is its excision with inch of the digital nerve.

## (7) Steps of operative treatment of hand trauma

- (1) Thorough exploration
- (2) Debridement
- (3) Arrest of hæmorrhage
- (4) Repair of torn tissues
- (5) Sutures or skin graft
- (6) Post-operative
  - (a) Position
  - (b) Movements

## (D) Deformities of the hand

## (1) Tissue classification

- (1) Skin burns scar
- (2) Palmar fascia
  - (a) Congenital
  - (b) Dupuytren
- (3) Tendons sloughing adhesions
- (4) Muscles Volkmann
- (5) Nerves paralysis, irritations, trophic
- (6) Bones
  - (a) Congenital manus valgus
  - (b) Traumatic mal union of fractures

## (2) Causes of claw hand

- (a) Ulnar paralysis (trauma, leprosy neuro-fibroma)
- (b) Cervical rib
- (c) Syringomyelia
- (d) Acute anterior poliomyelitis
- (e) Progressive muscular atrophy
- (f) Amyotrophic lateral sclerosis

## (3) Causes of thenar atrophy without sensory disturbances

- (a) Occupational gardeners, charwomen
- (b) Gouty median neuritis
- (c) Arthritic trapezo-metacarpal
- (d) Senile

## (E) Miscellaneous

## (1) Causes of bony swellings in hand.

- (1) Trauma callus, mal-united fracture
- (2) Sepsis septic osteoperiostitis
- (3) Specific
  - (a) Tuberculous dactylitis
  - (b) Syphilitic dactylitis
- (4) New growths
  - (a) Enchondromata
  - (b) Exostoses
- (5) Congenital macrodactyly
- (6) Hormonic gigantism

## (2) Spindle-shaped bony swellings

- (1) Tuberculous dactylitis
- (2) Syphilitic dactylitis
- (3) Enchondromata

## (3) Multiple tumours in the upper extremity

- (1) Multiple neuro-fibromata
- (2) Multiple lipomata adiposis dolorosa

- (3) Multiple exostoses
  - (4) Multiple enchondromata of the hand
  - (4) Do not forget leprosy in any ulcerous or trophic condition of the hand.
  - (5) Causes of axillary swellings
    - (1) Enlarged lymph glands
      - (a) Septic
      - (b) Tuberculous
      - (c) Lymphadenomatous
      - (d) Secondary carcinomatous
    - (2) Abscess
      - (a) Acute
        - (1) Lymphadenic
        - (2) Ribs or spine
        - (3) Neck
        - (4) Breast
        - (5) Empyema necessitatis
      - (b) Cold
    - (3) Primary tumours of the axilla
      - (A) Lipoma subpectoral
      - (B) Cystic hygroma
      - (C) Sarcoma
      - (D) Carcinoma of axillary tail of the breast
      - (E) Aneurysm of the axillary artery
-

## CHAPTER IX

# THE LOWER EXTREMITY

### I. DEFORMITIES OF THE LOWER EXTREMITY :

#### (A) DEFORMITIES AT THE HIP REGION :

##### (1) CONGENITAL DISLOCATION OF THE HIP

(See under Hip Joint)

##### (2) COXA VARA

**Def** Diminution in the angle between the neck and the shaft of the femur

**Etio** (1) General bone diseases

(2) Local bone diseases

(3) Trauma

(A) Acute mal united fracture

(B) Chronic slipped epiphysis

#### Clinical types

##### (A) Adolescent or epiphyseal Coxa vara

**Etio** Boys between 10 and 16

Bilateral

**Causes** (1) Trauma :

(a) Non-traumatic

(b) Pre-traumatic

(c) Traumatic

(d) Post traumatic

(2) Infection Low grade

**Path** (A) Factors

(a) Endocrine disorder

Pituitary dysfunction

(b) Muscular traction

(c) Trivial trauma

(B) Path-anatomy

(a) Backward rotation of the epiphysis

+ (b) External rotation of lower limb

##### (B) Infantile or cervical Coxa vara

**Etio** Girls between 5 and 11

**Causes** (1) Trauma Partial fracture of the femoral neck

(2) Developmental error Fairbank

Separate diaphysial spur of Walsby

(3) Rickets

(4) Congenital

- Clinic**
- (1) **Children between 5 and 14**
  - (2) **Limping**
  - (3) **Pain and spasm in hip joint**  
Slight initial or recurrent
  - (4) **Inspection**
    - (A) **Limb adducted + everted + shortened**
    - (B) **Great troch. Elevated and prominent**
  - (5) **Palpation**  
Great trochanter elevated and prominent
  - (6) **Movements**
    - (A) **Chronic stage**
      - (i) **Limitation of Abduction and inversion**
      - (b) **Exaggeration of Adduction and flexion**
    - (B) **Acute traumatic stage**  
Limitation of all movements
  - (7) **Measurements**
    - (A) **Short leg**  
Ant. sup. spine → medial malleolus
    - (B) **Elevated trochanter**
      - (a) **Nelaton's line**
      - (b) **Bryant's  $\Delta$**
      - (c) **Chene's parallels**
      - (d) **Shoemaker's lines**
      - (e) **Morris' bitrochanteric distances**
      - (f) **Trendelenburg's sign**
  - (8) **Spinal compensatory deformity**  
Scoliosis, lordosis
  - (9) **X Rays**
- Planes**
- (a) **Antero-posterior**
  - (b) **Lateral**
- Changes**
- (1) **Altered contour of the neck**  
Upper border of the neck is to the head
    - (a) **At tangents**
    - (b) **In transverse line**
    - (c) **In convex line**  
at (a) Junction of head and neck  
or (b) Junction of neck and trochanter
  - (2) **Epiphysial changes**
    - (a) **Fluffiness**
    - (b) **Vertical plane**
    - (c) **Separate diaphysial spur**



- (3) Changes in the bone texture  
 (4) Mal united fracture femoral neck  
       (in traumatic cases)
- Diff diag (1) **Tuberculous hip**  
 (2) *Congenital dislocation of the hip*  
 (3) Traumatic arthritis  
 (4) Infective arthritis  
 (5) Paralysis infantile, spastic
- Treatment
- (1) **Early cases**
- (1) (a) **Rest in bed** For 6 months  
       ↓ (b) Crutches for 6 months  
       ↓ (c) Calliper splint for 24 months
- (2) (a) **Skeletal traction**  
       By Kirschner's wire  
       Through (a) Lower end of femur  
               (β) Tibial tubercle  
       In 25° abduction  
       With 15-20 lbs. weight  
       1 or 8 weeks  
       ↓ (b) Rest in bed for 2 weeks  
       ↓ (c) Walking calliper for 24 weeks
- (3) **Light traction on frame or sliding bed**  
       1 or (a) 6-12 months  
           (b) Till X Ray shows fusion
- (4) (a) Anæsthesia  
       ↓ (b) Manipulative abduction  
       ↓ (c) **Plaster fixation** For 6 months  
       ↓ (d) Walking calliper
- (5) **Operative fusion Epiphysiodesis**  
       (a) Multiple drilling  
       (b) Tibial bone graft  
       (c) Three-flanged nail  
       Do not allow the patient to leave the  
       hospital until the epiphysis has fused
- (11) **Late cases Operative treatment**
- Ind (1) Infantile or cervical coxa vara  
 (2) Late cases  
 (3) Marked deformity  
       (a) Adduction  
       (b) External rotation
- (1) **Sub-trochanteric osteotomy of Gant**  
 (a) Osteotomy at the level of trochanter minor  
       (α) Simple  
       (β) Wedge-shaped

- ↓ (b) Adductor tenotomy
- ↓ (c) Fixation
  - By Plaster-of Paris
  - In Extreme abduction
  - For 3 months
- ↓ (d) Walking calliper
- (2) **Excision of femoral head**
  - (a) Excise the head of the femur
- ↓ (b) Fixation
  - By Plaster-of Paris
  - In Abduction and hyperextension
  - For 6 months
- (3) **Bifurcation osteotomy of Lorenz**

## (B) DEFORMITIES AT THE KNEE REGION

### (3) GENU VALGUM knock knee

- Eti (1) **Static**
- (a) Deficient postural activity  
(Lax muscles and ligaments)
  - + (b) Improper attitudes
- (2) **Compensatory**
- (a) Hip deformities
  - (b) Foot deformities
- (3) **General bone diseases**
- (a) Rickets
  - (b) Osteomalacia
- (4) **Local bone diseases**
- (a) Mal united fracture
  - (b) Separated epiphyses
- (5) **Renal dwarfism** (See under kidney)
- (a) Knock knee
  - + (b) Nephritis
  - + (c) Dwarfism

### Path Body weight transmitted through outer knee

- ↓ (a) Overstretching of inner ligaments and tendons
- + (b) Contraction of outer ligaments and tendons
- + (c) Bending of adjacent portions of shafts of bones
- + (d) Changes in the texture of bones and epiphyses
  - (a) Internal hypertrophy irritation
  - (b) External atrophy pressure
- + (e) **Compensatory deformities**
  - (a) Flat foot
  - (b) Bowed tibia
  - (c) Coxa vara
  - (d) Scoliosis

Sites	(1)	Lower end of the femur
	(2)	Knee joint
	(3)	Upper end of the tibia
Clinic	(1)	Time toddling period
	(2)	Abnormal gait <b>Fatigue gait</b>
	(3)	<b>Abnormal posture</b>
	(A)	<i>With knees extended</i>
		Hip Flexed
		Femur Inverted and adducted
		Knee Slightly flexed and abducted
		Tibia Everted and abducted
		Feet Lverted and flat
	(B)	<i>With knees flexed</i>
Compl		Whole deformity disappears
	(1)	<b>Compensatory deformities</b> (See above)
	(2)	<b>Dislocation patella</b>
	(3)	Osteoarthritis
	(4)	Flail joint
Treat	(A)	<b>Small children</b> <b>Conservative</b>
	(1)	Treat the underlying cause
	(2)	Massage, movements, physiotherapy
	(3)	Splints
		(a) Thomas external steel bar
		(b) Ext. splint from troch to boots
	(B)	<b>Older children</b>
	(1)	<b>Repeated moulding</b>
		↓ Plaster fixation
	(2)	<b>Manual osteoclasis</b> Under anaesthesia
		↓ Plaster fixation
		↓ Physiotherapy
	(C)	<b>After the age of 4</b>
	(1)	<b>Osteoclasis</b>
		(a) Manual before the age of 4
		(b) Osteoclastic between 4 and 8
		(c) Open after the age of 8
	(2)	<b>Osteotomy :</b>
Tech	(a)	Linear
	(b)	Cuneiform
Sites	(a)	Lower end of femur
		5 front & above adductor tubercle
	(b)	Upper end of tibia
		below the tibial tubercle

- Steps**
- (a) Incision
  - ↓ (b) Insertion of osteotome → rotation to right angle
  - ↓ (c) Division of bone anterior → posterior
  - ↓ (d) Manual fracture

- Dangers**
- (1) Haemorrhage
  - (2) Epiphyseal injury
  - (3) Joint injury
  - (4) Septic

- After treat**
- (1) **Splinting** For ten days
  - ↓ (2) **Fixation**  
By Plaster of Paris  
In Over-corrected position  
For Six weeks
  - ↓ (3) **Walking calliper** For six months
  - + (4) **Physiotherapy**

(4) **GENU VARUM** Bow leg

- Facto**
- (1) **Congenital** Intra uterine position
  - (2) **Static**
  - (3) **Compensatory**
  - (4) **General bone diseases**
  - (5) **Local bone diseases**
  - (6) **Riding**

- Varieties**
- (1) **Genu varum** Deformity of femur and tibia near the knee joint
  - (2) **Bow leg** Deformity of shaft ends of tibia and fibula

**Path** Body weight transmitted through inner knee

- ↓ (a) Stretching of external ligaments
- + (b) Contracture of internal ligaments
- + (c) Hypertrophy of outer condyles irritation
- + (d) Atrophy of inner condyles pressure
- + (e) Compensatory foot deformities  
Planus or valgus

- Clinic**
- (1) Time infancy
  - (2) **Abnormal gait** : Rolling gait
  - (3) **Abnormal posture**  
Femur : Abducted and everted  
Tibia : Adducted and inverted

- Compl**
- (1) **Pes planus**
  - (2) **Pes valgus**
  - (3) **Dislocation patella**
  - (4) **Synovitis or osteoarthritis**
  - (5) **Flail joint**

## Treat (1) Conservative

## (A) Manipulations

+ Physiotherapy

+ Shoes with outside up

↓ (B) Splint or steel to the inner side of the leg  
For 6 months

## (2) Operative

Ind (a) Age over 4

(b) Severe deformity

## (A) Osteoclasis

(a) Manual before 4

(b) Mechanical between 4 and 8

(c) Open after 8

## (B) Osteotomy

(a) Closed after 4

(b) Open in adults

(a) Linear

(β) Cubiform

## (5) GENU PECURVATUM

Def Abnormal hyperextension at the knee joint

Ftio (1) Congenital

(2) Acquired

(a) Infantile paralysis

(b) Mal united fracture

(c) Rupture cruciate ligaments

(d) Prolonged recumbency static

(e) Compensatory to

(α) Talipes equinus

(β) Genu valgum

Clinic (1) Deformity hyperextended knee joints

(2) Abnormal gait

Treat (1) Treatment of etiology

(2) Conservative

Manipulations and physiotherapy

(3) Operative in advanced cases in adults

(A) Transverse osteotomy of the tibia  
1 below knee

↓ (B) Compensatory setting of the fragments

↓ (C) Fixation

By splint

In (a) Knee flexion for 1 week

↓ (b) Knee extension for 4 weeks

↓ (D) Calliper splint for 12 weeks

## (C) DEFORMITIES OF THE LEG

## (6) ANTERIOR BOW LEG

Def Anterior or antero-external curvature of tibia

**Ptlo (A) Gravitational at the lower third of tibia**

- (a) Gravity  
 + (b) Bone softening  
     (a) Rickets  
     (β) Osteomalacia  
     (γ) Osteitis deformans

**(B) Deposition of new bone**

**At the centre of tibia**

**Syphilis** Congenital or acquired

**Clinic (A) Local Tibia and fibula**

**(1) Forward bending** with lateral flattening

- (a) Lower third in gravitational  
 (b) Central in syphilis

**(2) Texture alterations**

- (a) Buttress in the concavity - rickets  
 (b) Ab-sorption osteomalacia  
     early osteitis deformans  
 (c) Deposition and eburnation  
     Syphilis  
     Late osteitis deformans

**(B) General signs of etiological disease**

**Treat (1) Treat the etiology**

**(2) Osteoclasis** (a) Manual before 4  
 (b) Osteoclastic between 4 and 8

**(3) Osteotomy** after 8  
 (a) Closed linear  
 (b) Open linear or cuneiform

**After treat** I xization

By Plaster of Paris  
 In Corrected position  
 For 4 weeks

**Post. compl** (1) Fracture  
 (2) Non-union

## **(D) DEFORMITIES OF THE FOOT**

**Talipes** Pedal deformity

**Def** Of primary deformities

- (1) **Talipes equinus** Plantar flexion at  
     (a) Ankle  
     (b) Mid tarsal
- (2) **Talipes calcaneus** Dorsiflexion at the ankle
- (3) **Talipes varus**  
     (a) Inversion at (α) Sub-a tragaloid  
     + (β) Mid tarsal  
 + (b) Adduction at mid tarsal  
     (Metatarsus varu )



**(D) Muscles****(1) Postero-internal group**

Contractures

**(2) Extensors + peroneals** Stretched**(E) Skin and subcutaneous tissues****Dorso-lateral region**

Irritation ulcer callouses

- Clinic (1) Whole foot Plantarflexion  
+ inversion  
+ adduction
- (2) Fore foot Plantarflexion  
+ inversion  
+ adduction
- (3) Heel Inversion + drawn up
- (4) Ankle Plantarflexion
- (5) Sole Concave and upside
- (6) Inner border Concave and upside
- (7) Outer border Convex and down
- (8) Walking on (a) Toes & outer border of foot  
↓ (b) Dorsum & outer side of foot

Diff diag

<i>Congenital</i>	<i>Acquired</i>
From birth	Acquired later
Bilateral	Unilateral
No trophic changes	Trophic changes
Primary	Secondary

**Treat (1) Manipulations with massage**

Ind Within one week after birth

Frequency Two or three times a day

Method Correction of

(a) Plantarflexion + adduction  
Of fore-foot

↓ (b) Inversion of whole foot

↓ (c) Plantarflexion at the ankle

**(2) Manipulations**

With correction retentive apparatus

- (a) Adhesive strapping
- (b) Malleable tin splints
- (c) Plaster beds
- (d) Special shoes

**(3) Forcible corrections with plaster fixation**

Ind (a) Child a few months old

(b) Resistance to manipulative treatment

Steps (a) Deep anaesthesia

↓ (b) Forcible over-correction

(a) Manual upto 5 years

(b) Thomas wrench after 5 years



## ↓ (c) Fixation

By Plaster-of Paris

In Over-corrected position

Extent (α) Upto lower thigh  
 With knee at right angles  
 or (β) Upto tibial tubercle  
 If walking to be allowed

Changes At monthly intervals

## ↓ (d) Physiotherapy

With out wedged shoes

## (4) Operations on soft parts

Ind (a) Age upto 4 years

(b) Failure of conservative

(A) Achilles tenotomy (See under Tendons)

(B) Trethowan

Capsulotomy of internal joints

Tech (a) Incision

4" above the ankle to first metatarsal

Parallel to tibia posterior

Below and parallel to inner bony margin of the foot

(b) Detachment of abductor hallucis

(c) Forward displacement of long tendon

(d) Division of internal ligaments

(1) Long plantar

(2) Short plantar

(3) Calcaneo-navicular

(a) Superior

(3) Internal

(γ) Inferior

(i) Deltoid

(5) Internal astragalo-calcaneal

(6) Metatarsal-cuneiform

(7) Scapho-cuneiform

(h) Detachment of origin of

(1) Plantar fascia

(2) Sole muscles

(f) Stretching the foot in over-correction

(g) Plaster fixation

After-treat (1) Change of plaster

At the end of two weeks

↓ (2) Second plaster for 12-24 weeks

↓ (3) Physiotherapy + outwedged shoes

## (C) Steindler → Trethowan :

(1) Steindler (See page 79)

(a) Tourniquet

- (b) Incision 2-5
  - 5 above the sole
  - parallel to inner border
  - down to os calcis
- (c) Division of
  - (1) Plantar aponeurosis
  - (2) Calcaneo-metatarsal bands
- (d) Reflection anteriorly of all structures on
  - (1) Under-surface of os calcis
  - (2) Inner surface of os calcis
- + (2) Trethowan (See above)
- (D) Transplantation of tibialis anticus
  - Into cuboid or base of 5th metatarsal
  - (See under Tendons)
- (F) Bankart silk operation
  - Double-stranded thick silk
  - From Base of 5th metatarsal
  - To 5 above the ankle
- (5) Operations on bones
  - Ind Adults
  - (A) Elmslie Osteotomy of (a) Astragaloid neck
  - (b) Os calcis
  - (B) Astragalectomy
  - (C) Cuneiform tarsiectomy
- (6) Operations on joints
  - Arthrodesis of (a) Subastragaloid
  - + (b) Mid-tarsal

#### Criterion of cure

- (1) Passive dorsiflexion 20 beyond right angle
- (2) Passive plantarflexion 60 beyond right angle
- (3) Inversion complete
- (4) Eversion complete

#### (2) TALIPES EQUINUS

Eti (1) Congenital

(2) Acquired

(A) Organic

(a) Paralytic

- (a) Central upper neuron type
- (b) Spinal anterior poliomyelitis
- (c) Peripheral nerve trauma

(b) Muscles myopathies  
myositis fibrosa

(c) Bones Mal-united fractures

(d) Joints Mal-ankylosis

(e) Skin cicatricial

**(B) Compensatory**

To shortening of the extremity

**(C) Gravitational** Talipes decubitus**(D) Symptomatic** Tender heel  
Hysteria**Path** Contracture of tendo Achilles**(A) Fibrotic****(B) Spasmodic****(a) Primary****(b) Secondary****Clinic** **(A) Limp with****(a) Ankle plantar flexed****(b) Knee flexed****(c) Hip flexed****(B) Walking on toes with heel in mid-air****Compl** **(1) Callosities and ulcers on metatarsal heads****(2) Osteoarthritis of the ankle and joints of the foot****Treat** **(1) Treat the underlying cause in secondary cases****(2) Primary cases****(A) Preventive****(a) Drop-foot right-angled splint****+ (b) Physiotherapy****(B) Palliative****Ind** Shortening less than one inch**Method** Raise the heel of the shoe**(C) Operative****(1) Soft tissue operations****(a) Achilles tenotomy**

(See under Tendons)

**(2) Subcutaneous****(b) Open****(h) Trothowan****Calf muscle-sliding****(1) Detachment of origins of all calf muscles including gastrocnemius****(p) Sliding and correction of deformity****(2) Bones and joints operations****(a) Osteotomies****(b) Excision of the ankle with arthrodesis****(3) PES PLANUS AND VALGUS****Def** **(A) Pes planus** Dorsiflexion and abduction of the fore-foot at mid tarsal joint due to weakness of long arch**(B) Pes valgus**

Eversion of the foot at subastragaloid joint

*Anatomy & Physiology*(A) *Arches of the foot*

## (1) Long arch of the foot

(a) Posterior pillar Calcaneal tuberosity

(b) Keystone Talus

(c) Anterior pillars

(α) Internal Navicular

Three cuneiforms

Three internal metatarsals

Three inner toe phalanges

(β) External Cuboid

Two outer metatarsals

Two outer toe phalanges

(d) Important bony points

(a) Calcaneal tuberosity

(b) Talus

(γ) Head of first metatarsal

(δ) Head of fifth metatarsal

## (2) Transverse arch of the foot

Site Necks of all metatarsals

*Maintained by Ligaments and small muscles of the sole*(B) *Supports of the foot-arches*

## (1) Tendons

(a) Peroneus longus

(b) Tibialis posterior

## (2) Muscles and tendons

(a) Long flexors

(b) Short muscles of the sole

(c) Intermediate plantar aponeurosis

## (3) Ligaments

(a) Articular capsule

(b) Interosseous ligaments

(c) Accessory ligaments

(α) Spring or plantar calcaneo-navicular

(β) Long planter

(γ) Short planter

## (4) Bones Constituting the arch

(C) *Maintenance of the arch is done by*

## (1) Muscles:

(a) Postural reflex activity

(b) Voluntary contractions

## (2) Ligaments: Attitude ligamentaire

; When muscle tone is exhausted

Path (1) *Acquired Weak or fatigue flat foot*

(a) Disturbance between work and rest

↓ (b) Exhaustion of muscles

↓ (c) Exhaustion of reflex postural activity

↓ (d) Attitude ligamentaire

↓ (e) Yielding of inner ligaments

- ↓ (f) Yielding of inner part of bony arch
- ↓ (g) Passive valgus pes valgus
- ↓ (h) Mid tarsal breakdown pes planus
  - (a) Fore-foot abduction + dorsiflexion
  - (b) Back foot
    - Adduction + plantarflexion + eversion

(2) **Congenital**

Diminution in the normal angle ( $30^\circ$ ) between the neck and body of the astragalus

*Clinical types*

- (A) (1) **Congenital**
  - (a) Calcaneo-valgus
  - (b) Valgus
  - (c) Planus
- (2) **Infantile**
  - Pes planus
  - In fat rickety infants
- (3) **Adolescent**: Compensatory to leg deformities
- (4) **Menopausal**
  - Chronic foot strain due to Obesity
- (B) (1) **Acute foot strain**: Athletes
- (2) **Sub-acute foot strain**: Convalescence
- (3) **Chronic foot strain**: Obesity
- (C) (1) **Paralytic**: Infantile paralysis
- (2) **Spastic**
  - (a) Short tendo Achilles
  - (b) Spastic peroneals
- (3) **Traumatic**
  - (a) Mal united Pott's fracture
  - (b) Fracture os calcis
- (4) **Infective**
  - (a) Tonsil foot
  - (b) Gonorrhoeal flat foot
- (5) **Ankylosing**: Mal-ankylosis of ankle joint
- (6) **Attitudinal**: Ill fitting boots
- (7) **Compensatory**: Genu valgum or varum

*Causal types*

- (1) **Nervous**: Infantile paralysis, nerve palsies
  - (2) **Muscular**: Muscle spasm or paralysis
  - (3) **Ligamentous**: Tonsil and gonorrhoeal
  - (4) **Bony**: Mal union of fractures
  - (5) **Joint**: Mal-ankylosis
  - (6) **Secondary**
    - (a) Compensatory
    - (b) Attitudinal
- } (See above)

*Clinical degrees*

- (1) Auto-correction (Voluntary)
- (2) Hetero-correction (Involuntary)
- (3) Non-correction (Rigid)

*Clinics* (A) **Symptomless** : congenital

- (B) **With symptoms**

- (1) **Faulty gait**
- (2) **Pain** (a) Local under the neck of the talus and navicular  
(b) Referred
- (3) **Sensation of fatigue**
- (4) **Tenderness**
- (5) **Rigidity**
- (6) **Swelling** (a) **Oedema**  
(b) **Congestion**
- (7) **Movements**
  - (a) **Restriction**
    - Of Adduction + plantar flexion
    - At Ankle and mid tarsal
    - By (a) **Spasm**  
↓ (β) **Adhesions**  
↓ (γ) **Adaptive shortenings**  
↓ (δ) **Structural changes**
  - (b) **Restriction**
    - Of Dorsiflexion
    - At Ankle
    - By Short tendo Achilles

**Signs**

- (8) **Lowered inner border of the foot**
- (9) **Transverse spread out of the metatarsals**
- (10) **Prominent navicular**
- (11) **Foot print on floor**

**Diff diag** (1) **Rheumatoid arthritis**

(2) **Osteoarthritis**

(3) **T. B. tarsus**

(4) **Other causes of pain and disability of foot**

**Compl** (1) **Hallux**

(a) **Valgus**

(b) **Flexus**

(c) **Rigidus**

(2) **Hammer toes**

**Treat** (1) **Rest in bed** For two weeks

Ind (a) **Acute foot strain**

(b) **Infective flat foot**

(c) **Spastic flat foot**

(2) **Physiotherapy and foot drill**

Ind (a) **Auto-correction**

(b) **Foot strain with free movements\***

**Contraind** (a) **Spastic flat foot**

(b) **Infective flat foot**

- ↓ (f) **Yielding of inner part of bony arch**
- ↓ (g) **Passive valgus** pes valgus
- ↓ (h) **Mid tarsal breakdown** pes planus
  - (a) Fore-foot abduction + dorsiflexion
  - (b) Back foot
    - Adduction + plantarflexion + eversion
- (2) **Congenital**
  - Diminution in the normal angle (30°) between the neck and body of the astragalus

*Clinical types*

- (A) (1) **Congenital**
  - (a) Calcaneo-valgus
  - (b) Valgus
  - (c) Planus
- (2) **Infantile**
  - Pes planus
  - In fat rickety infants
- (3) **Adolescent** Compensatory to leg deformities
- (4) **Menopausal**
  - Chronic foot strain due to Obesity
- (B) (1) **Acute foot strain** Athletes
- (2) **Sub-acute foot strain** Convalescence
- (3) **Chronic foot strain** Obesity
- (C) (1) **Paralytic** Infantile paralysis
- (2) **Spastic** (a) Short tendo Achilles  
(b) Spastic peroneals
- (3) **Traumatic** (a) Mal united Pott's fracture  
(b) Fracture os calcis
- (4) **Infective** (a) Tonsil foot  
(b) Gonorrhoeal flat foot
- (5) **Ankylosing** Mal-ankylosis of ankle joint
- (6) **Attitudinal** Ill fitting boots
- (7) **Compensatory** Genu valgum or varum

*Causal types*

- (1) **Nervous** Infantile paralysis, nerve palsies
- (2) **Muscular** Muscle spasm or paralysis
- (3) **Ligamentous** Tonsil and gonorrhoeal
- (4) **Bony** Mal union of fractures
- (5) **Joint** Mal-ankylosis
- (6) **Secondary** (a) Compensatory } (See above)  
(b) Attitudinal }

*Clinical degrees*

- (1) **Auto-correction** (Voluntary)
- (2) **Hetero-correction** (Involuntary)
- (3) **Non-correction** (Rigid)

*Clinical*

- (A) **Symptomless congenital**
- (B) **With symptoms**

- (1) **Faulty gait**
- (2) **Pain** (a) Local under the neck of the talus and navicular  
(b) Referred
- (3) **Sensation of fatigue**
- (4) **Tenderness**
- (5) **Rigidity**
- (6) **Swelling** (a) Edema  
(b) Congestion
- (7) **Movements**
  - (i) **Restriction**
    - Of Adduction + plantarflexion
    - At Ankle and mid tarsal
    - By (a) Spasm  
↓ (b) Adhesions  
↓ (c) Adaptive shortenings  
↓ (d) Structural changes
  - (b) **Restriction**
    - Of Dorsiflexion
    - At Ankle
    - By Short tendo Achilles

**Signs**

- (8) **Lowered inner border of the foot**
- (9) **Transverse spread out of the metatarsals**
- (10) **Prominent navicular**
- (11) **Foot print on floor**

**Diff diag**

- (1) Rheumatoid arthritis
- (2) Osteoarthritis
- (3) T B tarsus
- (4) Other causes of pain and disability of foot

**Compl**

- (1) **Hallux**
  - (a) Valgus
  - (b) Flexus
  - (c) Rigidus
- (2) **Hammer toes**

**Treat**

- (1) **Rest in bed** For two weeks
  - Ind (a) Acute foot strain
  - (b) Infective flat foot
  - (c) Spastic flat foot
- (2) **Physiotherapy and foot drill**
  - Ind (a) Auto-correction
  - (b) Foot strain with free movements\*
- Contraind** (a) Spastic flat foot  
(b) Infective flat foot



## (4) PES CAVUS

Def	Rigid exaggeration of longitudinal arch
With	(a) Retraction of toes (b) Depression of anterior transverse arch
Etio	(1) Inherited Bilateral symptomless (2) Adolescent Bilateral neuritic (3) Familial Bilateral (4) Infantile paralytic Unilateral (5) Acquired secondary : (a) Neurogenic (α) Central (β) Spinal (γ) Peripheral (b) Muscular (α) Spastic (β) Paralytic (γ) Contractures (c) Compensatory : Short leg (d) Foot wear
Path	Duchenne's theory : (1) (a) Transient paralysis of intrinsic muscles ↓ (b) Uncontrolled long extensors and flexors ↓ (c) Metatarso-phalangeal over-extension ↓ (d) Depression of anterior transverse arch (2) Contracture and wasting of sole muscles
Clinic	(1) Plantar flexion of fore-foot over the back foot (2) Metatarso-phalangeal over extension (3) Depression of anterior transverse arch (4) Hammer toes (5) Stiffness and sense of fatigue
Compl	(1) Hammer toes (2) Metatarsalgia (3) Adventitious bursæ, callosities, corns ulcers
Treat	(A) Treat the underlying etiology (B) Local (1) Preventive and conservative (a) Daily passive manipulations (b) Active exercises (c) Faradic stimulation (d) Night splints foot right angled and valgus toes flexed and straight (e) Shoes (α) Metatarsal bars (β) Outside wedges

## (2) Operative

## (A) Foot

## (1) Subcutaneous division of plantar fascia

↓ Manipulative flattening

↓ Fixation

By Plaster-of Paris

In Corrected position

For 6 weeks

## (2) Steindler's operation

Ind (a) Marked deformity

(b) Older children → young adults

## (3) Steindler + Trethowan (See Equino-varus)

↓ Fixation

By Plaster-of Paris

In Corrected position

For 6 weeks

Ind Severe cases

## (B) Toes (See under Deformities of Toes)

Group I High arch + tight plantar fascia in paralytic children

Treat (1) Steindler

↓ (2) Plaster fixation for 3 weeks

↓ (3) Shoes with low heel

Group II Broad fore-part + depressed metatarsal arch

Treat (A) Steindler → plaster for 3 weeks

↓ (B) Tendon transplant of ext. dig. long. to metatarsal necks  
+ Metatarsophalangeal capsulotomy (2nd and 3rd toes)

↓ Plaster for 12 weeks

Group III: High arch + bone deformity

Treat (A) Steindler

↓ (B) Wedge osteotomy: after 3 weeks on outer side

↓ (C) Plaster fixation for 12 weeks

*Stages of pes cavus with their treatment. (Med. Ann. 1930)*

## (1) First stage

Path Short tendo Achilles

Treat (a) Stretching of tendo Achilles

+ (b) Metatarsal bar

## (2) Second stage

Path (a) Short tendo Achilles

+ (b) Hammer great toe

Treat (a) Subcutaneous tenotomy of plantar fascia

+ (b) Extensor hallucis transplantation

+ (c) Wrenching of the high arch

## (3) Third stage:

Path (a) High arch

+ (b) All toes-curved

Treat Steindler

- (4) Fourth stage  
 Path (a) High arch  
       + (b) Hammer toes  
       + (c) Mid-tarsal varus  
 Treat Wedge resection
- (5) Fifth stage  
 Path Paralytic foot  
 Treat (a) Lisfranc amputation  
       + (b) Astragalectomy

## (5) DEPRESSED ANT TRANSVERSE ARCH

- Syn Transverse flat foot
- Anatomy Arch formed by heads of all metatarsals  
 Pillars formed by  
 (1) First metatarsal head  
 (2) Fifth metatarsal head
- Eti (1) Improper foot wear  
 (2) Pes cavus  
 (3) Rheumatoid arthritis
- Path (a) Inability of toes to flex  
       ↓ (b) Hyperextension at metatarso-phalangeal joints  
       ↓ (c) Depression of transverse arch  
       ↓ (d) Body weight on middle metatarsal heads  
       ↓ (e) Compression of plantar nerves
- Clinic Intermittent neuralgia in connection with 4th toe  
 only when shoe is worn. (Morton's metatarsalgia)
- Compl (1) Callosities, burse, corns, ulcers  
       Under metatarso-phalangeal joints  
 (2) Morton's metatarsalgia
- Treat (1) **Conservative**  
       (A) Foot wear  
           (a) Metatarsal bar } behind metatarsal  
           (b) Insole           } necks  
       (B) Metatarsal strapping  
       (C) Manipulations under anaesthesia
- (2) **Operative:**  
       Extensor tenotomy  
       ↓ Fixation of the toes  
           By Plaster-of Paris  
           In Full flexion  
           For 4 weeks  
       ↓ Physiotherapy
- (3) **Morton's metatarsalgia:**  
       (a) Conservative shoes, strapping supports  
       (b) Operative  
           Excision of 4th metatarsal head

**(E) DEFORMITIES OF THE TOES:****(1) HALLUX VALGUS**

**Def** Lateral deviation of the great toe from its alignment with the first metatarsal at the metatarsophalangeal joint

**Etio** (1) Metatarsus atavicus  
(2) Short and pointed boots  
(3) Improper walking

**Path** (a) Lateral deviation of the great toe from first metatarsal  
+ (b) Medial deviation of first metatarsal from the second  
↓ (c) External displacement of long tendons of the great toe  
↓ (d) Loss of support to the long arch  
↓ (e) Flat foot  
+ (f) Depression of anterior transverse arch  
+ (g) Hammer toes

**Clinic** Deformity (1) Primary hallux valgus  
(2) Secondary flat foot hammer toes

**Compl** (1) Bunion  
(2) Osteoarthritis  
(3) Flat foot  
(4) Metatarsalgia  
(5) Hammer toes

**Treat** (1) Conservative  
(A) Broad shoes with  
(a) Inner wedge  
(b) Peg between first and second toes (Toe post)  
(B) Strapping lenkoplast  
(2) Operative

**Ind** Age more than 10 years

**Contraind** (a) Pronounced spur formation  
(b) Considerable osteoarthritis

(A) Operations on Bones

(1) Slicing operation

Excision of exostosis with one third of inner part of the metatarsal head

(2) Oblique or wedge osteotomies of the metatarsal neck

**Tech** (a) Incision flap with convexity on the dorsum on the inner side of the joint

↓ (b) Dissection of the flap including capsule on inner and anterior side

- ↓ (c) Division of soft tissues on outer side
- ↓ (d) Osteotomy of the metatarsal neck
- ↓ (e) Closure

## (3) Excision of

(a) Metatarsal head

or (b) Base of the first phalanx

## (4) Trethowan

Tech (a) Split off the exostosis with portion of metatarsal head

↓ (b) Division of metatarsal base

↓ (c) Adduction of distal portion

↓ (d) Impaction of exostosis-wedge

↓ (e) Manipulation of big toe into varus

Post-treat (1) Fixation of the great toe

By Splint

In Over-adduction and flexion

For 5 weeks

↓ (2) Massage, movements and physiotherapy  
: from 3rd week

↓ (3) Walking from 6th week

↓ (4) Shoes, night splints for 24 weeks

## (B) Operations on soft tissues

## (1) Capsuloplasty :

(a) Reefing the internal ligament

(b) Division of external ligament

## (2) Tendon transplantations

(a) Small adductor

From phalanx to metatarsus

+ (b) Abductor hallucis

To medial side of proximal phalanx

After treat Fixation

By Bandage

In Adduction and flexion

For 8 weeks

With (a) Active movements 1 week after operation

(b) Physiotherapy 2 weeks

(c) Shoes and work 6 weeks " "

(d) Full recovery 24 weeks = "

## (2) HALLUX RIGIDUS AND FLEXUS

Def Pain stiffness, swelling and flexion of the big toe  
due to (a) Acute or chronic arthritis  
or (b) Tenosynovitis of ext. hall. long

Etiol (1) Trauma

(2) Septic

(3) Rheumatoid

- (4) Gouty
  - (5) Osteoarthritis
  - (6) Osteochondritis dissecans
  - (7) Extra metatarsal epiphysis
  - (8) Bad shoes
  - (9) Secondary to flat foot
- Path** (A) Arthritis of first metatarsophalangeal joint
- (a) Acute traumatic
  - (b) Chronic osteoarthritic
- (B) Tenosynovitis of extensor hallucis longus
- Clinic** (1) Hallux rigidus pain + tenderness + spasm
- (2) Hallux flexus flexion
- (3) Wearing out of the boot: outer sole and border
- Clinical types** (1) Acute
- (2) Chronic
- Treat** (A) Acute hallux rigidus and flexus
- (1) Rest in bed
  - ↓ (2) Immobilisation in splint or plaster
  - ↓ (3) Elastoplast strapping
  - ↓ (4) Radiant heat
  - ↓ (5) Foot wear
- With metatarsal bar  
inner border wedge
- (B) Chronic hallux rigidus and flexus
- (1) Conservative
  - Foot wear with metatarsal bar
  - (2) Operative
  - Ind Resistant cases only
  - Oper (1) Cheilo-tomy
  - (2) Excision metatarsal head
- (3) HAMMER TOE
- Def** (1) Hyperextension of first phalanx
- (2) Hyperflexion of second phalanx
- (3) Extension or flexion of third phalanx
- Eti** (1) Congenital
- (2) Secondary to
- (a) Hallux valgus
  - (b) Pes cavus
  - (c) Bad boots
- Path** Duchenne's theory (See under Pes Cavus)
- Clinic** (1) Claw toes (See definition)
- (2) Associated or etiological foot deformities
- (a) Pes cavus
  - (b) Hallux valgus

- Compl (a) Callosities  
       (b) Adventitious bursae  
       (c) Corns  
       (d) Ulcers
- Treat (1) Preventive Splinting special boots  
                           Manipulations  
                           Physiotherapy  
                           *Etiological treatment*
- (2) Operative
- (A) Congenital  
       Subcutaneous division of a phalanx  
       Ind Age 3 years
- (B) Acquired
- (a) Soft tissue operations
- (1) Subcutaneous tenotomy of flexor and capsule  
       At the site of flexion (ventral)
- (2) Subcutaneous tenotomy of extensors and capsule  
       At the site of extension (dorsal)
- (3) Robert Jones Tendon transplantation
- (a) Ext. hall. brevis to first metatarsal neck  
       + (b) Ext. hall. longus to dorsum first phalanx
- (4) Trethowan Tendon transplantation + tenotomy
- (a) Flex. hall long into proximal phalanx  
       + (b) Tenotomy of long & short extensor tendons
- (b) Bone operations
- (1) Excision  
       Of first or of all metatarsal heads
- (2) Excision + arthrodesis  
       Of first interphalangeal joint
- (3) Higgs spike operation  
       With arthrodesis head of the first phalanx to fit into base of the second phalanx
- (c) Mixed operations :  
       Lambrinudi :  
       Tenotomy + arthrodesis
- (1) Tenotomy of long and short extensor tendons

+ (2) Excision and arthrodesis of interphalangeal joints

(3) Palliative Shoes and arch supports

## (II) SPECIAL AFFECTIONS OF THE FOOT:

### (I) TRAUMA OF THE FOOT

#### (1) Open wounds

Etio (a) Incised glass pieces  
(b) Punctured glass nails thorns  
(c) Lacerated run-overs

Compl (1) **Sepsis** Suppuration  
Cellulitis  
Lymphangitis  
Lymphadenitis

(2) **Anaerobic infection** Tetanus  
Gas gangrene

(3) **Gangrene** Senile  
Diabetic

(4) Retention of foreign bodies

(5) Haemorrhage

Treat (1) Tourniquet  
(2) Thorough exploration  
(3) Complete debridement with oxidation  
(4) Hypertonic pack  
+ (5) Prophylactic anti-tetanus serum  
anti-gas-gangrene serum

Ind (a) Punctured wounds  
(b) Soiled wounds  
(c) Street wounds

#### (2) Crushed injuries

Etio Run-overs

Path Laceration of soft tissues + comminuted fractures

Treat (1) Debridement excision of dead tissues  
repair of living & viable tissues  
(2) Amputation only if necessitated

#### (3) Impact injuries

Etio Falls from height

Path (1) **Local fractures & dislocations with impaction**  
Bilateral or unilateral  
(a) Fracture of calcis  
(b) Fracture-dislocations of ankle joint

(2) **Associated distant fractures**

(a) Tibia + fibula  
(b) Femur  
(c) Spine

#### (4) Twisting injuries



Etio	Falls with tripping	
Path	(a) Sprains	} near about ankle joint
	(b) Fractures	
	(c) Dislocations	

(5) **Osteochondritis juvenilis** (See page 288)

Sever Kohler Freiburg

*The tissues affected*

- (1) Skin punctured and lacerated wounds
- (2) Ligaments and fasciae tearing
- (3) Tendons ruptures and divisions
- (4) Bones fractures
  - (a) Pott
  - (b) Wagstaffe
  - (c) Dupuytren
  - (d) Calcaneus
  - (e) Talus
  - (f) Navicular
  - (g) Metatarsals
  - (h) Phalanges
- (5) Joints
  - (a) Sprains
  - (b) Dislocations
  - (c) Open wounds

Special compl	(a) Tetanus
	(b) Gas-gangrene
	(c) Lymphangitis → lymphadenitis
	(a) Popliteal
	(β) Femoral
	(γ) Inguinal
	(δ) Iliac

(II) **INFECTIONS OF THE FOOT**

(A) **Pyogenic sepsis**

- (1) **Acute pyogenic sepsis**

Etio	(a) Septic wounds punctured
	(b) Septic warts, corns, burse
Path	(a) Local abscess
	(b) Cellulitis
	(c) Lymphangitis
Compl	(a) Lymphadenitis
	(α) Femoral
	(β) Iliac
	(b) General sepsis
	(c) Local extension bone
- (2) **Chronic pyogenic sepsis**

Etio	(a) Pyogenic infection
+	(b) Accessory factors
	(1) Anatomical bone joint
	(2) Physiological bad circulation

- (3) Mechanical want of rest
- (4) Metabolic diabetes
- (5) Foreign body  
Sequestrum needle, thorn
- (6) Therapeutic deficient drainage

Clinic Non-healing chronic septic focus

Compl Inguinal lymphadenitis

### (B) Specific Infections

#### (1) Tuberculosis

- (A) T B. Ankle
- (B) T B Tarsus

#### (2) Mycetoma

Def A tropical fungous disease affecting the foot and characterised by

- (a) Enlargement
- (b) Multiple sinuses
- (c) Oily discharge

Eti Village population of South India

Path Infection by white or black fungus mycetoma

- ↓ (a) Only degeneration and fusion of tissues
- (b) Network of sinuses and cystic spaces
- (c) Bones
  - (a) Affected in some cases
  - (b) Free in other cases

Clinic (1) Nodules: Small firm, rounded painless

- ↓ (2) Sinuses (a) Viscid oily discharge
- (b) Minute greyish particles

#### ↓ (3) Elephant-foot

Solid coarse, nodular swelling with multiple discharging sinuses

#### + (4) Atrophied leg muscles

Treat (A) Pot. iodide in large doses

(B) Amputation

#### (3) Guinea-worm (See page 25)

- (a) Abscess
- (b) Ulcer
- (c) Cellulitis
- (d) Synovitis Ankle

#### (4) Filariasis (See under Filariasis)

#### (5) Leprosy (See under Leprosy)

### (III) ULCERS OF THE FOOT

#### (1) Chronic traumatic or septic ulcer

Eti Factors

- (a) Anatomical nature of tissues
- (b) Physiological defective circulation
- (c) Mechanical want of rest

- (d) Metabolic diabetes
- (e) Foreign body sequestrum needle
- (f) Therapeutic bad drainage
- Treat (1) Treat the etiological factor
- (2) Open treatment rest + elevation  
correct dressings  
ultra-violet rays
- (3) Closed treatment  
Plaster fixation after emollient dressings
- (2) Neurogenic ulcer (See page 34)
  - (a) Perforating ulcer deep or through-and through
  - (b) Trophic ulcer superficial
- (3) Circulatory ulcer  
Raw area after separation of circulatory gangrene
- (4) Diabetic ulcer (See page 35)
- (5) Specific ulcers
  - (A) Tuberculous
  - (B) Syphilitic
  - (C) Leprosy toes and fore-foot
 } Round about the ankle
- (6) Metabolic Gouty ulcer  
First metatarso-phalangeal joint
- (7) Pressure sores (See page 31)
  - (A) Splint sores back of the heel over Achilles tendon
  - (B) Plaster sore " "
  - (C) Bed sore " "
  - (D) Irritation sore convexity of deformed foot
  - (E) Ulcerating corn
  - (F) Ulcerating adventitious bursa
- (8) Moisture ulcers  
Etiology Moisture and sepsis between toes  
Clinic (1) Irritation dermatitis with foul smell  
(2) Perspiring feet  
Treat (1) Keep dry spirit with zinc borac  
(2) Foot wear perforated and spacious
- (9) Ingrowing toe-nail :  
Etiology Ill fitting boots + too short nail  
Site Outer side of hallux  
Path Septic irritation  
↓ Inflammation  
↓ Chronic ulceration  
Clinic Nail embedded in granulations from the overhanging  
margin with foul discharge  
Treat (1) Preventive square nails  
square spacious boots  
cleanliness and dryness

## (2) Operative

(a) Avulsion of the nail

(b) Willet Excision of skin flap 5 wide

(c) Cheyne Excision of { skin flap  
half of nail  
half of nail matrix

(d) Amputation of last phalanx

## (IV) SINUSES OF THE FOOT

(1) Osteomyelitic sinus : Leads to necrosed bone

(2) T B sinus Ankle or tarsus

(3) Mycetoma foot

(4) Actinomycosis

(5) Perforating sinus

## (V) GANGRENE OF THE FOOT (See under Gangrene)

## (A) Circulatory gangrene

(1) Impaired circulation

(2) Embolism

(3) Thrombosis thrombosed aneurysm

(4) Ligation Hunter's operation for popliteal aneur

(5) Indirect traumatic

(6) Pressure on vessels

(7) Senile arteriosclerotic

(8) Thrombo-angitis obliterans

(9) Raynaud

## (B) Neurogenic gangrene Trophic ulcers

(a) Bed-sores

(b) Splint sores

(c) Perforating ulcers

(d) Leprosy

## (C) Direct traumatic gangrene

## (D) Physical chemical and thermal gangrene

(1) Heat burns

(2) Cold frost-bite

(3) Escharotics

## (E) Infective gangrene

(1) Acute inflammatory

(2) Gas gangrene

## (F) Diabetic gangrene

## (VI) SPECIAL NEW GROWTHS OF THE FOOT

(1) Warts and corns (See page 39)

Etiology (a) Ill fitting boots

(b) Points of pressure

Clinic Pain, tenderness, induration, lumping

Complication (a) Inflammation → cellulitis

↓ (b) Suppuration

- ↓ (c) Ulceration  
 ↓ (d) Gangrene in diabetics
- (2) **Epithelioma** (See page 41)  
 Etio (a) Chronic ulcers and sinuses  
 (b) Tar and paraffin
- (3) **Melanoma malignum** (See page 43)  
 Syn **Melanotic whitlow**  
 Site **Edge of the matrix of the hallux nail**  
 Clinic (a) **Paronychia ulcer with or without pigment**  
 (b) **Thrombosed veins and black streaks on leg**  
 (c) **Enlarged femoral lymph glands**  
 (d) **Secondaries**
- (4) **Sub-ungual exostosis**  
 Path (a) **Fibroma**  
 or (b) **Cancellous osteoma**  
 Site **Under the hallux nail**  
 Clinic (1) **Painful separation of the nail**  
 (2) **Underlying hard tumour**  
 (3) **Limping**  
 Compl (1) **Infection**  
 (2) **Chronic ulceration**  
 (3) **Osteomyelitis**  
 Treat **Excision of nail and the growth**

(VII) **DEFORMITIES OF THE FOOT** (See above)

(III) **SPECIAL AFFECTIONS OF THE LEG :**

(I) **TRAUMA**

(1) **Skin and subcutaneous tissues**

(A) **Contusions**

Site **Over the shin**

Etio **Falls, hits**

Compl (1) **Periostitis**  
 (2) **Non or delayed healing**

(B) **Lacerations :**

(1) **Primary**

(2) **Secondary to open fractures**

(2) **Muscles and tendons**

(A) **Ruptures**

(a) **Tennis leg** (See page 63)

(b) **Gastrocnemius** (See page 63)

(c) **Tendo Achilles** ( " " 64)

(B) **Luxations**

(a) **Peronei**

(b) **Tibialis ant. and post.** } (See page 65)

(3) **Nerves** Common peroneal (See page 123)

Etio Fracture neck of fibula

Excision fibular head

(4) **Bones**

(A) Periosteal contusions

Secondary to skin contusions

(B) Fractures (See under Fractures)

(a) Tibia

(b) Fibula

(c) Tibia + fibula

## (II) INFLAMMATIONS IN THE LEG

## (A) ACUTE INFLAMMATIONS

(1) **Boils**

Site Shin

Clinic Very painful

Toxæmia +

Compl Bone infection

(2) **Lymphangitis**

Etio Primary focus in the foot

Clinic (a) Septic focus in the foot

(b) Tender femoral glands

Compl Lymphadenitis

(a) Femoral

(b) External iliac

(3) **Cellulitis:**

Etio (a) Ascending lymphangitis

(b) Acute osteomyelitis

(c) Guinea-worm

(4) **Abscess**

Etio (a) Suppurating gumma

(b) Intra muscular abscess

(c) Osteomyelitic abscess

(d) Guinea worm abscess

(5) **Acute periosteomyelitis:** (See under Bones)

Etio Some small suppurative focus

Clinic (1) Toxæmia + +

↓ (2) Painful tender oedematous, diffuse inflammatory swelling of the leg

+ (3) Knee effusion

↓ (4) Presenting abscess leg

↓ (5) Rupture with amelioration of general symptoms

- Compl (a) **Chronic periosteomyelitis**  
 (b) Fibrotic contractures of the calf muscles  
 (c) Knee joint sepsis

(6) **Acute traumatic sepsis**

Etiol Infected open fractures

(B) **CHRONIC INFLAMMATIONS**

(1) **Chronic traumatic**

- (a) Foreign bodies  
 (b) Chronic sprain knee or ankle  
 (c) Osteochondritis tibial tubercle  
 (d) Chronic bursitis around knee

(2) **Chronic septic**

- (a) Non-healing of acute inflammations  
 (b) Chronic periosteomyelitis tibia  
 (c) Baker's cysts near about the knee

(C) **SPECIFIC INFLAMMATIONS**

(1) **Tuberculosis** Bazin's disease (See page 22)

(2) **Syphilis:**

- (a) **Skin** Gummatous ulcer or scar  
 Site Round about knee or lower leg  
 Clinic (a) Ulcer (See page 23)  
 (b) Scar  
 Round, thin, papery multiple  
 (b) **Muscles** Gumma  
 Site Calf muscles  
 Clinic (a) Hard mobile tumour → abscess  
 (b) Therapeutic test  
 Diff. diag (1) Sarcoma (a) Muscular  
 (b) Bony  
 (2) Any other tumour or abscess  
 (c) **Bones** Syphilitic scleroses

(3) **Elephantiasis** (See under Filariasis)

(III) **ULCERS OF THE LEG**

(A) **NON INFECTIVE**

(1) **Circulatory ulcers:**

- (a) Varicose ulcer (See page 33)  
 (b) Ischaemic ulcer Post-gangrenous ulcer  
 Non-healing ulcer with circulatory inadequacy

(2) **Mechanical ulcers** (See page 35)

Non-healing due to mechanical factors

(3) **Neurogenic ulcers**

- : **Trophic ulcer:** Underlying nerve paralysis  
 (a) Peripheral  
 (b) Spinal

## (B) INFECTIVE

- (1) **Osteomyelitic ulcer**  
Sinus or extensive ulcer  
Adherent to and leading to the bone
- (2) **Eczematous ulcer** (See page 34)  
Secondary to varicose veins

## (C) SPECIFIC

- (1) **Syphilitic ulcer** (See page 23)  
Sites (a) Round about the knee  
(b) Lower part of the leg
- (2) **Tuberculosis** Bazin's disease (See page 22)

## (D) ULCERATING TUMOURS

- (1) **Epithelioma** (See page 41)  
Eti (a) Burns scar  
(b) Varicose ulcer  
(c) Osteomyelitic sinus
- (2) **Fungating sarcoma**  
(a) Bone  
(b) Muscle

## (IV) GANGRENE OF THE LEG (See Gangrene Foot)

- Special gangrenes
- (1) Direct traumatic gangrene
  - (2) Anaerobic: gas-gangrene
  - (3) Ascending gangrene from foot
  - (4) Embolic gangrene

## (V) NEW GROWTHS OF THE LEG

- (1) **Skin and subcutaneous tissues**
    - (A) **Epithelioma**: (See above and page 41)
    - (B) **Popliteal lipoma**  
Clinic Lobulated irregular soft, popliteal swelling
    - (C) **Neuro-fibroma** (See page 101)
  - (2) **Muscles and tendons**
    - (A) **Ganglion** (See page 76)
    - (B) **Sarcoma**  
Site Calf muscles  
Clinic Diffuse hard or soft tumour incorporated with the muscle fibres movable on the bone
- Diff. diag
- (1) Gumma
  - (2) Bone sarcoma or giant-celled tumour
- (3) **Bones** (See under Bones)
    - (A) **Chondroma**: (See under bones)  
Site Upper end of tibia
    - (B) **Osteoma** Ossifying chondroma



- Compl (a) **Chronic periosteomyelitis**  
 (b) Fibrotic contractures of the calf  
 (c) Knee-joint sepsis

(6) **Acute traumatic sepsis**

Etio Infected open fractures

(B) **CHRONIC INFLAMMATIONS**

(1) **Chronic traumatic**

- (a) Foreign bodies  
 (b) Chronic sprain knee or ankle  
 (c) Osteochondritis tibial tubercle  
 (d) Chronic buritis around knee

(2) **Chronic septic**

- (a) Non healing of acute inflammation  
 (b) Chronic periosteomyelitis tibia  
 (c) Baker's cysts near about the

(C) **SPECIFIC INFLAMMATIONS**

(1) **Tuberculosis** Bazin's disease (9)

(2) **Syphilis**

- (a) **Skin** Gummatous ulcer or abscess  
 Site Round about knee or leg  
 Clinic (a) Ulcer (See page 33)  
 (b) Scar  
 Round thin, pale

(b) **Muscles** Gumma

Site Calf muscles

- Clinic (a) Hard mobile tumour  
 (b) Therapeutic test

- Diff diag (1) Sarcoma (a) Mus  
 (b) Bone  
 (2) Any other tumour

(c) **Bones** Syphilitic sclerosis

(3) **Elephantiasis** (See under Filariasis)

(III) **ULCERS OF THE LEG**

(A) **NON INFECTIVE**

(1) **Circulatory ulcers**

- (a) Varicose ulcer (See page 33)  
 (b) Ischaemic ulcer Post-gangrene  
 Non-healing ulcer with circulatory  
 inadequacy

(2) **Mechanical ulcers** (See page 35)

Non-healing due to mechanical factors

(3) **Neurogenic ulcers:**

- Trophic ulcer Underlying nerve  
 (a) Peripheral  
 (b) Spinal

## (B) INFECTIVE

## (1) Osteomyelitic ulcer

Sinus or extensive ulcer  
Adherent to and leading to the bone

## (2) Eczematous ulcer (See page 34)

Secondary to varicose veins

## (C) SPECIFIC

## (1) Syphilitic ulcer (See page 23)

Sites (a) Round about the knee  
(b) Lower part of the leg

## (2) Tuberculosis Bazin's disease (See page 22)

## (D) ULCERATING TUMOURS

## (1) Epithelioma (See page 41)

Eti (a) Burns scar  
(b) Varicose ulcer  
(c) Osteomyelitic sinus

## (2) Fungating sarcoma

(a) Bone  
(b) Muscle

## IV) GANGRENE OF THE LEG (See Gangrene Foot)

al gangrenes (1) Direct traumatic gangrene  
(2) Anaerobic gas-gangrene  
(3) Ascending gangrene from foot  
(4) Embolic gangrene

## (V) NEW GROWTHS OF THE LEG

## (1) Skin and subcutaneous tissues :

(A) Epithelioma : (See above and page 41)

(B) Popliteal lipoma

Clinic Lobulated irregular soft popliteal swelling

(C) Neuro-fibroma : (See page 101)

## (2) Muscles and tendons

(A) Ganglion (See page 76)

(B) Sarcoma

Site Calf muscles

Clinic Diffuse hard or soft tumour incorporated with  
the muscle fibres movable on the bone

Diff. diag (1) Gumma

(2) Bone sarcoma or giant-celled tumour

## (3) Bones (See under Bones)

(A) Chondroma (See under bones)

Site Upper end of tibia

(B) Osteoma Ossifying chondroma

- Compl (a) **Chronic periosteomyelitis**  
 (b) Fibrotic contractures of the calf muscle  
 (c) Knee-joint sepsis

(5) **Acute traumatic sepsis**

Etio Infected open fractures

## (B) CHRONIC INFLAMMATIONS

### (1) Chronic traumatic

- (a) Foreign bodies  
 (b) Chronic sprain knees or ankle  
 (c) Osteochondritis tibial tubercle  
 (d) Chronic bursitis around knee

### (2) Chronic septic

- (a) Non-healing of acute inflammations  
 (b) Chronic periosteomyelitis tibia  
 (c) Baker's cysts near about the knee

## (C) SPECIFIC INFLAMMATIONS

### (1) Tuberculosis Bazin's disease (See page 22)

### (2) Syphilis

- (a) **Skin** Gummatous ulcer or scar  
 Site Round about knee or lower leg  
 Clinic (a) Ulcer (See page 23)  
 (b) Scar  
 Round, thin, papery multiple

### (b) Muscles Gumma

- Site Calf muscles  
 Clinic (a) Hard mobile tumour → abscess  
 (b) Therapeutic test  
 Diff diag (1) Sarcoma (a) Muscular  
 (b) Bony  
 (2) Any other tumour or abscess

### (c) Bones Syphilitic scleroses

### (3) Elephantiasis (See under Filariasis)

## (III) ULCERS OF THE LEG

### (A) NON INFECTIVE

#### (1) Circulatory ulcers

- (a) Varicose ulcer (See page 33)  
 (b) Ischaemic ulcer Post-gangrenous ulcer  
 Non-healing ulcer with circulatory inadequacy

#### (2) Mechanical ulcers (See page 35)

Non-healing due to mechanical factors

#### (3) Neurogenic ulcers

- Trophic ulcer: Underlying nerve paralysis  
 (a) Peripheral  
 (b) Spinal

**(B) INFECTIVE****(1) Osteomyelitic ulcer**

Sinus or extensive ulcer

Adherent to and leading to the bone

**(2) Eczematous ulcer (See page 34)**

Secondary to varicose veins

**(C) SPECIFIC****(1) Syphilitic ulcer (See page 23)**

Sites (a) Round about the knee

(b) Lower part of the leg

**(2) Tuberculosis Bazin's disease (See page 22)****(D) ULCERATING TUMOURS****(1) Epithelioma (See page 41)**

Eti (a) Burns scar

(b) Varicose ulcer

(c) Osteomyelitic sinus

**(2) Fungating sarcoma**

(a) Bone

(b) Muscle

**(IV) GANGRENE OF THE LEG (See Gangrene Foot)**

- cial gangrenes (1) Direct traumatic gangrene  
 (2) Anaerobic gas-gangrene  
 (3) Ascending gangrene from foot  
 (4) Embolic gangrene

**(V) NEW GROWTHS OF THE LEG****(1) Skin and subcutaneous tissues****(A) Epithelioma (See above and page 41)****(B) Popliteal lipoma**

Clinic Lobulated irregular soft, popliteal swelling

**(C) Neuro-fibroma (See page 101)****(2) Muscles and tendons****(A) Ganglion (See page 76)****(B) Sarcoma**

Site Calf muscles

Clinic Diffuse hard or soft tumour incorporated with the muscle fibres movable on the bone

Diff. diag (1) Gumma

(2) Bone sarcoma or giant-celled tumour

**(3) Bones (See under Bones)****(A) Chondroma (See under bones)**

Site Upper end of tibia

**(B) Osteoma Ossifying chondroma**

**(C) Giant-celled tumour :**

- Site (a) Upper end of tibia  
 (b) Upper end of fibula

**(D) Sarcoma**

- Path (a) Parosteal  
 (b) Periosteal  
 (c) Endosteal  
 (d) Ewing

Site Tibia

- Diff diag (1) Periosteomyelitis  
 (2) New growths of bone  
     (a) Chondroma  
     (b) Osteoma  
     (c) Giant-celled  
 (3) Sarcoma or gumma of the muscle

**(VI) DEFORMITIES OF THE LEG (See above)****(VII) SPECIAL CONDITIONS OF THE LEG**

- (1) Popliteal aneurysm (See under Blood-vessels)  
 (2) Varicose veins : ( " " )

**(III) SPECIAL AFFECTIONS OF THE THIGH :****(I) TRAUMA****(1) Skin and subcutaneous tissues**

- (a) Stab wounds } Arterio-venous aneurysm  
 (b) Gunshot wounds }  
 (c) Lacerated wounds  
     (a) Run-overs  
     (b) Secondary to fractures

**(2) Muscles and tendons :**

- Ruptures (a) Quadriceps extensor (See under knee)  
 (b) Adductors (See under Muscles)

- Sequelæ (1) Adhesions and fibrosis  
 (2) Myositis ossificans

**(3) Bones (See under Fractures)**

- Fractures (1) Femoral neck  
 (2) Trochanteric  
 (3) Shaft  
     (a) Upper third  
     (b) Middle third  
     (c) Lower third  
 (4) Condylar

**(II) INFLAMMATIONS IN THE THIGH****(A) ACUTE**

- (1) Abscess

**(2) Femoral lymphadenitis**

- Etiol Septic focus on foot  
 Clinic Tender inflamed enlargement  
 Compl (1) Abscess  
 (2) Extension to higher glands ext. iliac

**(3) Acute osteomyelitis femur (See under Bones)**

- Etiol Children  
 Site (a) Lower extremity  
 (b) Upper extremity

- Clinical types (1) Acute classical  
 (2) Septicæmic  
 (3) Pseudo-arthritis  
 Swelling of the knee or hip  
 (4) Abscess thigh in later stages

- Diff diag (1) Cellulitis  
 (2) Muscular abscess  
 (3) Arthritis  
 (4) General fevers

**(B) CHRONIC**

- (1) Chronic abscess  
 (a) Lymphatic gland abscess  
 (b) Chronic bursal abscess  
 (c) Psoas abscess  
 (d) Osteomyelitic cold abscess  
 (2) Chronic lymphadenitis  
 (a) Primary chronic  
 (b) Secondary to acute  
 (3) Chronic Bursitis (See page 90)  
 (a) Psoas  
 (b) Trochanteric  
 (c) Gluteal  
 (d) Supra patellar  
 (4) Chronic osteomyelitis (See under Bones)  
 (a) Secondary to acute osteomyelitis  
 (b) Septic open fractures

**(III) GANGRENE OF THE THIGH**

- (1) Secondary to gangrene leg and foot  
 (2) Gas-gangrene

**(IV) NEW GROWTHS OF THE THIGH**

- (1) Skin and subcutaneous tissues  
 Femoral lipoma

- (2) Bone  
 (A) Chondroma  
 Site Lower end of the femur

- ↓ (B) Osteoma  
 Site Lower end of the femur

(C) **Giant-celled tumour**

Site Lower end of the femur

(D) **Sarcoma**(V) **DEFORMITIES IN THE THIGH (See above)**(VI) **SPECIAL CONDITIONS IN THE THIGH**

- (1) **Vein** (a) **Saphenous varix**  
(b) **Femoral vein thrombosis**
- (2) **Artery** *femoral aneurysm*
- (3) **Artery + vein** *arteriovenous aneurysm*
- (4) **Femoral hernia**
- (5) **Ectopic testis**

(IV) **PAIN IN THE LOWER EXTREMITY:**(1) **PAIN IN THE THIGH AND LEG**(A) *Neuralgic pain*(1) **Sciatica (See page 121)**(a) **Primary** *Peripheral neuritis*(b) **Secondary to**(a) *Pressure in gluteal region*(β) *Hip joint disease*(γ) **Pelvic disease***New growths**Inflammatory masses**Pregnant uterus**Sacroiliac disease*(δ) **Spinal disease**(1) *Vertebrae* *trauma*  
*tuberculosis*  
*osteoarthritis*  
*malignancy*(2) *Prolapse of nucleus pulposus*(3) *Spinal column: tumour*  
*meningitis*(2) **Femoral neuralgia or neuritis***(See page 121)*(a) **Primary**(b) **Secondary** *aneurysm*  
*iliac growths*  
*femoral hernia*(3) **Obturator neuralgia or neuritis***(See page 121)*(a) **Primary**(b) **Secondary** *T B. hip*  
*sacroiliac disease*  
*pelvic growths*  
*obturator hernia*  
*carcinoma rectum*

(4) **Meralgia parasthetica** (See page 120)

- Etio (a) Prolonged standing  
 (b) Obesity  
 (c) Flat foot

(5) **Multiple peripheral neuritis**(6) **Tabetic crises**(B) **Circulatory pain** (See under Blood vessels)(1) **Varicose veins**

Feeling of heaviness and fatigue

(2) **Intermittent claudication**

Fatigue, pain and cramps after working  
 relieved by rest

Etio (a) Arterio-sclerosis with thrombosis

(b) Thrombo-angitis obliterans

(c) Raynaud

(3) **Acute circulatory pain** Embolic gangrene(C) **Referred visceral pain**

(1) **Rectum** Carcinoma

(2) **Bladder** Carcinoma

(3) **Prostate** Carcinoma

(4) **Uterus** Displacements

New growths

Pregnancy

(5) **Kidney** Renal colic

(2) **PAIN IN THE HEEL**(1) **Skin**

(a) **Shoe bites** Back of the heel

(b) **Corns** Sole of the heel

(c) **Chronic ulcers**

(2) **Bursae**

(A) **Achillo-bursitis** (See page 92)

Etio (a) Traumatic

(b) Gonorrhoeal

Site Between the tendon and bone

Clinic (1) Acute } Inflammatory swelling  
 or Chronic } under the tendon

(2) **Achilles spasm** painful dorsiflexion

(3) **Inability to wear shoes**

Treat (a) Treat the etiology

↓ (b) Physiotherapy and raised heel

↓ (c) Plaster-of Paris fixation

↓ (d) Excision of the bursa

(B) **Bunion** Adventitious bursa

Etio Foot deformity (Hallux valgus)



Path: (a) Pressure and irritation  
 ↓ (b) Tissue reaction  
 ↓ (c) Fibrous hyperplasia with fluid  
 ↓ (d) Adventitious bursa

Clinic Callosity over a bony prominence

Compl Inflammation → suppuration → ulceration

(a) Traumatic

(b) Septic

Treat (1) Excision

(2) Treat the etiology

### (3) Ligaments

#### (A) Trauma

(a) Sprain } of { (a) Achilles insertion  
 (b) Rupture } { (b) Malleolar lig  
 (c) Long planter lig  
 (d) Ankle joint lig.

#### (B) Fibrositis

(a) Gonorrhoeal

(b) Rheumatic

(c) Gouty

(d) Toxic

#### (C) Calcification

### (4) Tendons

#### (A) Short tendo Achilles

Etio { Spasm  
 Contracture

Clinic Dorsiflexion limited (Talipes equinus)

Associated (a) Flat foot  
 (b) Claw foot

Treat (1) Stretching of gastrocnemius

↓ (2) Plaster fixation

#### (B) Subluxation of peroneal tendons

(See page 65)

### (5) Periosteum Subcalcaneal periosteal spur

#### (A) Traumatic contusion

#### (B) Periostitis of the os calcis:

Etio (1) Arthritis (a) Septic  
 (b) Toxic  
 (c) Metabolic 'gouty'  
 (2) Gonorrhoeal males between 18 & 35  
 bilateral  
 (3) Traumatic  
 (4) Static or mechanical  
 Path (a) Localised periostitis

- + (b) Ossification of the origins of :
  - (a) Plantar fascia
  - (β) Flexor brevis
- + (c) Adventitious bursitis
- Clinic (a) Painful and tender heel on
  - (a) Pressure
  - (β) Weight bearing
- (b) Limping
- (c) Thickened swollen and tender inner tuberosity of os calcis
- (d) X Ray spur
- Treat (1) Elimination of septic focus
- (2) Local
  - (a) Raise the heel of the boot
  - (b) Raise the inner border
  - (c) Arch supports

#### (6) Bones Calcaneus

##### (A) Congenital Calcaneal exostosis

- Path (1) Bilateral exaggerated development of outer upper posterior angle
- (2) Bilateral subcalcaneal spur

Compl Bursa between skin and tendo Achilles

Treat Excision through lateral incision

##### (B) Traumatic

- (1) Cracks and fractures ~
- (See under Fractures)

Etio Falls from height

Path Bilateral  
Comminuted

Associated Spinal fracture

- Compl (a) Flat foot
- (b) Osteoarthritis ankle

- (2) Traction-epiphysitis of os calcis
- (See under osteo-chondritis juvenilis)

Syn Sever's disease

Etio Girls

Age 10 years

Path Over action of gastrocnemius

↓ Epiphysitis of the posterior os calcis

- Clinic (1) Painful lumping
- (2) Tender posterior heel
- (3) X Ray

Fragmentation of epiphysis

- Diff. diag (1) Calcaneal spur
- (2) Achillo-bursitis
- (3) Planter fibrositis
- (4) Calcaneal periostitis

Treat Foot wear with

- (a) Cut back
- (b) Raised heel
- (c) Long arch support

(3) **Avascular traumatic necrosis**  
(See under Fractures)

(C) **Inflammatory**

- (1) Traumatic caries
- (2) Septic caries
- (3) Tuberculous caries
- (4) Mycetoma

(7) **Joints Ankle**

(A) **Trauma** Sprain, synovitis, dislocation  
Fracture-dislocation

(B) **Inflammation**

- (a) Traumatic
- (b) Septic
- (c) Toxic
- (d) Specific gonorrhoea
- (e) Metabolic } osteoarthritis
- (f) Mechanical }

(8) **Foreign body retention**  
Needles, nails, thorns, etc.

(3) **PAIN IN THE FORE FOOT**

(1) **Skin**

- (a) Shoe bites
- (b) Corns and callosities
- (c) Chronic ulcers
- (d) Bunions

(2) **Bursae** Adventitious bursa

(3) **Ligaments**

- (a) Trauma strain, sprain, rupture
- (b) Fibrositis gonorrhoeal rheumatic, toxic
- (c) Calcification

(4) **Tendons** Tenosynovitis

(5) **Bones**

(A) **Tarsus :**

- (a) Cracks and fractures
- (b) Osteochondritis of the navicular :  
Kohler
- (c) Avascular traumatic necrosis
- (d) T. B. tarsus
- (e) Mycetoma

(B) **Metatarsals**

- (a) Cracks and fractures :  
(1) Acute traumatic

(2) **Metatarsus atavicus**

Spontaneous fracture of second metatarsal

(3) **March fracture**

Etio Soldiers on march

On feet for long hours

Path Spontaneous fractures of second and third metatarsal necks

Clinic (a) No direct trauma  
(b) History of long hours on feet  
(c) Painful swollen, tender metatarsus

(d) \ Ray

(1) Crack

(2) Callus

Treat (1) Fixation

By Plaster-of Paris

For 6 weeks

(2) Sorbo-sponge insole

(b) **Osteochondritis of second metatarsus Freiberg**

Etio Traumatic circulatory disturbance

Site Head

Path Epiphysal fragmentation

Clinic Pain tenderness and swelling of second metatarsal head

Treat (1) Insole boot

(2) Excision of the metatarsal head

(c) **Morton's metatarsalgia**

(See under Deformities of the Foot)

(6) **Deformities**

(a) Flat foot

(b) Pes cavus

(c) Talipes

(7) **Circulatory pain** Circulatory gangrene(8) **Nerve pain** Nerve lesions(4) **PAIN IN THE TOES**

(1) Circulatory pain gangrene

(2) Nerve pain neuralgia

(3) Inflammatory pain whitlow

(4) Deformity pain

(a) Hallux valgus

(b) Hallux flexus

(c) Hallux rigidus

(d) Hammer toes

(5) **Miscellaneous causes**

(a) Ill fitting boots

- |                          |             |
|--------------------------|-------------|
| (b) Bunion               | } Great toe |
| (c) Ingrowing toe-nail   |             |
| (d) Sub-ungual exostosis |             |

## (V) SPECIAL SWELLINGS IN THE LOWER EXTREMITY:

### (1) SWELLINGS IN THE FEMORAL REGION

- (A) Reducible swellings with impulse
- (1) Femoral hernia reducible
  - (2) Saphena varix examine leg
  - (3) Psoas abscess examine spine
- (B) Irreducible swelling without impulse
- (1) Femoral hernia irreducible
  - (2) Lymph glands examine foot
  - (3) Primary tumours lipoma  
fibroma
  - (4) Ectopic testis examine scrotum
- (C) Deep swellings
- (1) Femoral aneurysm
  - (2) Arterio-venous aneurysm } Pulsatile
  - (3) Distended hip joint arthritic signs
  - (4) Distended ilio-psoas bursa } Flexion thigh
  - (5) Psoas abscess
  - (6) Bony swelling callus, new growth

### (2) POPLITEAL SWELLINGS

- (A) Fluid swellings:
- (1) Ganglion in relation to tendons
  - (2) Bursa anatomical situation
  - (3) Baker's cyst chronic knee affection
  - (4) Varicose vein varicosities leg
  - (5) Acute or chronic abscess  
Inflammatory signs
    - (a) Suppurating lymph glands
    - (b) Osteomyelitis femur
  - (6) Popliteal aneurysm pulsating tumour
- (B) Solid swellings of soft tissues
- Movable on the bone
- (1) Enlarged lymph glands
  - (2) Lipoma
  - (3) Sarcoma
- (C) Solid bony tumours Immovable on the bone
- (a) Trauma  
Callus formation lower end femur
  - (b) Inflammations
    - (1) Periostitis one-sided thickening
    - (2) Brodie's abscess all round thickening
  - (r) Tumours
    - (1) Chondroma femur tibia, fibula
    - (2) Osteoma "

- (3) Giant-celled tumour :  
Femur tibia, fibula, patella
- (4) Sarcoma endosteal and periosteal
- (3) SWELLING IN THE CALF
  - (1) Skin Elephantiasis  
Lymphatic, filarial neuro-fibromatous
  - (2) Muscles
    - (a) Gumma Reaction to pot. iodide
    - (b) Sarcoma Movable on the bone
  - (3) Bones
    - (a) Chronic periosteomyelitis
    - (b) Specific bone sclerosis
    - (c) Tumours
      - chondroma
      - osteoma
      - giant-celled tumour
      - sarcoma periosteal
      - endosteal
      - Ewing
- (4) SWELLING OF THE FOOT
  - (1) Elephantiasis Coarse nodulated thick skin
  - (2) Mycetoma Multiple sinuses
- (5) MULTIPLE TUMOURS ON THE INFERIOR EXTREMITY
  - (1) Multiple lipomata
  - (2) Multiple neurofibromata

## (VI) IMPORTANT POINTS

### (A) Congenital affections

- (1) Congenital talipes equino-varus and flat feet are two of the commonest congenital affections of the lower extremity
- (2) Congenital deformity is distinguished from the acquired by generally being bilateral and non-associated with trophic changes the pain and disability are less than in acquired form.

### (B) Trauma

- (1) Arterio-venous aneurysm of the femoral vessels is one of the sequelae of penetrating or gunshot wounds of the femoral region.
- (2) Mal-union of fractures is the most potent cause of pain and disability due to chronic osteoarthritis of distal joints.
- (3) Tennis leg is the most common muscular injury of the leg

- ( ) Punctured wounds and twisting injuries are important forms of trauma of the foot.
- (5) In any open wounds of the foot beware of
  - (a) Tetanus
  - (b) Gas-gangrene.
- (6) Fracture spine with bilateral fractures of os calcis is a common combination in falls from heights.
- (7) Comminuted fracture of os calcis is a potent cause of flat foot with disability and pain.
- (8) Every street wound
  - (A) Give prophylactic doses of
    - (a) Anti tetanus serum
    - (b) Anti-gas-gangrene serum.
  - (B) Look out frequently for
    - (a) Lock jaw even partial
    - (b) Local spasms of the part
    - (c) Crepitant feel round about the wound.

#### (C) Sepsis

- (1) Most common septic foci on the foot
  - (a) Punctured wounds
  - (b) Infected corns
  - (c) Ill pared nails
  - (d) Inflamed adventitious burse
- (2) Cellulitis round about the ankle  
? Guinea worm.
- (3) Chronic inflammatory swellings of the foot
  - (1) Elephantiasis
  - (2) Mycetoma
  - (3) T B bone or joint
- (4) Every case of sepsis on the foot  
Examine femoral and external iliac glands & vice versa.
- (5) Septic foci on the hallux
  - (a) Ingrowing toe nail
  - (b) Subungual exostosis
  - (c) Infected bunlon
  - (d) Whitlow
  - (e) Gout
- (6) Special complications of septic focus in the foot
  - (a) Tetanus
  - (b) Gas-gangrene
  - (c) Gangrene
  - (d) Lymphangitis

#### (D) Ulcers

- (1) Common ulcers on the fore foot
  - (1) Traumatic
  - (2) Septic whitlow

- (3) Specific leprosy
- (4) Circulatory post-gangrenous
- (5) Neurogenic perforating trophic
- (6) Secondary
  - (a) Ulcerating adventitious bursa or bunion
  - (b) Ingrowing toe nail
  - (c) Gouty ulceration
- (2) Commonest ulcers round about the ankle
  - (a) Varicose ulcer
  - (b) Gummatous ulcer
- (3) Commonest ulcers round about the knee
  - (a) Gummatous ulcers
  - (b) Traumatic ulcers (in children)
- (4) Varicose ulcer is the special ulcer of the leg just as lupus and rodent ulcer are the special ulcers of the face
- (5) Closed treatment (emollient dressing + plaster encasement) is very useful in chronic non-healing non specific ulcers of the leg and foot.

#### (E) Gangrene

- (1) Most common causes of gangrene of lower extremity
  - (a) Senile
  - (b) Thrombo-angitis obliterans
  - (c) Gas-gangrene
  - (d) Diabetic
  - (e) Traumatic
- (2) Remember gangrene in every septic wound on the foot of an elderly patient. Examine urine and arteries in every case.
- (3) Every diabetic is in the serious danger of diabetic gangrene starting in a negligible septic focus on the foot.
- (4) Periarterial sympathectomy is useful as a first step of amputation leg for dry gangrene and should be done about a week before the amputation.  
It improves the circulation of the leg for about three weeks giving
  - (a) More distal level
  - (b) Better healing
- (5) Every case of sepsis in the foot, especially street accidents look out for crepitant feel round about the wound  
Gas-gangrene may start with dramatic suddenness and be fulminating in character

#### (F) New Growths

Most common new growths of lower extremity

- (A) Round about knee joint
  - (1) Sarcoma
  - (2) Giant-celled tumour
  - (3) Chondro → osteoma



## (B) Leg

## (1) Sarcoma

## (a) Bony

(α) Parosteal

(β) Periosteal

(γ) Endosteal

## (b) Muscular

## (2) Epithelioma from a scar or an ulcer or a sinus

## (C) Foot

## (1) Papilloma corn and wart

## (2) Subungual exostosis

## (3) Melanoma malignum

## (G) Deformities

## (1) Coxa vara

(a) If a child between the ages of 10 and 16 develops an intermittent limp or complains of occasional stiffness in the thigh and knee, epiphyseal coxa vara must be suspected.

(b) Important clinical sign of coxa vara due to epiphyseal slip is limitation of internal rotation and abduction  
Normal internal rotation of femur is 30 - 40  
Normal external rotation of femur is 50 - 60

(c) Every stage in the diagnosis and treatment of slipped femoral epiphysis must be clearly controlled by radiographic examination in the lateral plane.

(d) Too short a treatment is no treatment at all in slipped epiphysis.

(e) The opposite hip must be kept under close observation and should be radiographed at intervals when under treatment for slipped femoral epiphysis of the other side.

(f) Varieties (a) Pathological (1) Epiphyseal  
(2) Cervical(b) Clinical (1) Congenital  
(2) Infantile  
(3) Adolescent  
(4) Rickets  
(5) Traumatic  
(6) Osteoarthritic(g) Clinic (a) Deformity  
Adduction and eversion  
(b) Limitations of  
Abduction and inversion(h) Treat (1) Conservative  
(a) Rest in bed  
or (b) Skeletal traction

or (c) Anæsthetic manipulations  
 ↓ Plaster fixation

- (2) Operative  
 (a) Subtrochanteric osteotomy  
 (b) Lorenz bifurcation  
 (c) Excision of femoral head

(2) **Genu valgum**

- (a) Genu valgum develops after the child begins to walk and denotes attitude of weakness  
 (b) Treat (A) Small children  
       (a) Splints  
       (b) Physiotherapy  
       (B) Older children  
       (a) Repeated moulding  
       (b) Manual osteoclasis  
       (C) After 4 years  
       (a) Osteoclasis  
       (b) Osteotomy  
 (c) After treat (1) Plaster-of Paris for 6 weeks  
                   ↓ (2) Walking calliper for 6 months.  
 (d) Genu valgum is a deformity at three places  
       (1) Deformity at the lower end of femur  
       (2) Deformity at the knee joint  
       (3) Deformity at the upper end of tibia.

(3) **Genu varum**

- (a) Genu varum develops from birth and denotes strength  
 (b) Bow leg is a deformity at three places  
       (1) Deformity at knee joint  
       (2) Deformity of the whole tibial shaft  
       (3) Deformity at the lower end of the tibia.

(4) **Talipes**

- (a) Talipes equinus (contracture of tendo Achilles)  
       ↓ Talipes valgus  
       + Genu valgum  
       + Genu recurvatum.  
 (b) Most common deformities of the foot are  
       (1) Flat foot pes planus  
       (2) Talipes equino-varus.  
 (c) Most common causes of talipes are  
       (1) Congenital  
       (2) Paralytic  
       (3) Static

(A) **Equino varus :**

- (1) There are two forms of congenital talipes equino-varus  
       (a) Navicular  
       (b) Internal cuneiform metatarsus varus

- (2) Treatment of talipes equino-varus
  - (a) Manipulations + retentive apparatus + physiotherapy
  - (b) Forceful corrections + repeated plaster fixations
  - (c) Operative after the age of 4 years
    - (a) Steindler
 

Division of muscular origins from os calcis
    - + (b) Trethowan capsulotomy of internal joints
    - + (r) Achilles tenotomy
  - (d) After treatment plaster immobilisation
- (3) Treatment for congenital talipes equino-varus should begin within first ten days of birth.

## (B) Pes planus Flat feet

- (1) Important arches of the foot and sequelae of their defects
 

<ol style="list-style-type: none"> <li>(a) Long arch of the foot</li> <li>    (a) Internal</li> <li>    (b) External</li> </ol>	}	→ Flat foot.
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- (b) Transverse or metatarsal arch of the foot → Morton's metatarsalgia.
- (2) The most important ligament supporting the longitudinal arch is the spring or the plantar calcaneo-navicular. The most important tendon support is tibialis posterior.
- (3) Persistence of passive abduction (valgus) due to toppling in of the inner pillars of the longitudinal arch is the first sign of weak foot.
- (4) In flat foot, it is not the deformity which is important. It is the disability which requires treatment.
- (5) Gravity and fatigue are important factors in flat foot.
- (6) Forceful manipulations of feet affected by acute foot strain are harmful.
- (7) When the length of tendo Achilles is to be examined dorsiflex the foot with knees straight.
- (8) Longitudinal arch is raised more by wedging the heel alone than if the sole and heel are both wedged.
- (9) Flat feet in children
  - (1) Shoes + physiotherapy + exercises
  - ↓ (2) Plaster in over-correction.
- (10) Flat feet in adults
  - (1) Shoes + physiotherapy + exercises
  - ↓ (2) Plaster in over-correction
  - ↓ (3) Sole plates.

## (C) Pes cavus

- (a) Avoid tenotomy of tendo Achilles in pes cavus. Steindler operation is very useful.
- (b) Deformities of the toes
  - (1) Hallux valgus
  - (2) Hallux flexus

(3) Hallux rigidus

(4) Hammer toes

**(H) Pain in lower extremity**

**(a) Chief causes of painful heel : Calcaneodynia**

(1) Achilles bursitis

(2) Os calcis exostosis

(3) Traction epiphysitis of os calcis

(4) Spur periostitis

(5) Corns

(6) Shoe-bite

**(b) Chief causes of painful hallux**

(1) Ingrowing toe nail

(2) Subungual exostosis

(3) Bunion hallux valgus

(4) Hallux rigidus osteoarthritis

(5) Whitlow

(6) Gout

(7) Shoe-bite

**(c) Metatarsal pain :**

(1) Morton's metatarsalgia

(2) March fractures

(3) Osteochondritis Freiberg

**(d) Circulatory pain in leg and foot**

(1) Dry gangrene in the neighbouring living tissues

(2) Embolic gangrene at the site of embolus

(3) Intermittent claudication calf muscles

**(e) Morton's metatarsalgia**

Cause giving way of transverse arch in

(a) Pes cavus

(b) Ill fitting boots

Clinic relief on taking away boots

**(f) Sciatica**

(a) Knee jerk is never affected in true sciatica, which is always unilateral

(b) Bilateral sciatica ? Spinal or pelvic lesion

(c) In every case of sciatica

(1) Examine the spine

(2) Make rectal or vaginal examination

(3) Enquire into rectal & urinary sphincter action

(4) Exclude malignancy

(e) Sciatica in elderly patients exclude malignancy first

(g) A careful examination of the abdominal and pelvic viscera is necessary in all cases of pain referred to legs without obvious local cause.

**(I) Operations**

(a) No operation on a joint should be carried out within six weeks of suppuration in the overlying bursa

- (b) Excision of the head of the first or the fifth metatarsal should be avoided as far as possible as it may lead to flat foot. Bases of proximal phalanges may be removed instead.

(c) Named operations

<i>Names</i>	<i>Indications</i>	<i>Technique</i>
Bankart	T equino-varus ...	Silk ligamentation
Cheyne	Ingrowing toe-nail ...	Excision of nail & skin fold
Dunn	Foot stabilisation	Triple arthrodesis of (a) Subastragaloid (b) Calcaneo-cuboid (c) Astragalo-cuneiform
Elmslie	T equino-varus ...	Osteotomy of (a) Os calcis (b) Talus neck
Gant	Trochanteric deformity	Subtrochanteric osteotomy
Higgs	Hammer toe ...	Spike arthrodesis
Lambrinudi	Hammer toe	Tenotomy + arthrodesis
Lorenz	Trochanteric deformity Hlp deformity	Bifurcation osteotomy below trochanter minor
Robert Jones	Hammer toe ...	Tendon transplantation
Steindler	T equino-varus Pes cavus	Division of all soft tissue origins from under and inner surfaces of os calcis
Trethowan	T equino-varus ... T equinus Hallux valgus Hammer toe	Capasutomy of int. joints Calf-muscle sliding Exostosis wedge Tenotomy + tendon transplant
Whitman	T calcaneus Pisil varus foot	Astragalectomy
Whitt	Ingrowing toe-nail ...	Skin flap excision

(j) Miscellaneous

(a) Abnormalities round about the nail

- (1) Ingrowing toe-nail
- (2) Subungual exostosis
- (3) Melanotic whitlow

(b) Ill fitting boots are the most common cause of :

- (1) Deformities
  - (a) Hallux valgus

- (b) Hallux rigidus
- (c) Hallux flexus
- (d) Hammer toes
- (e) Morton's metatarsalgia
- (2) Disabilities
  - (a) Corns
  - (b) Callosities
  - (c) Bunions
  - (d) Burns adventitious
  - (e) Ingrowing toe-nail
  - (f) Foul-smelling feet
  - (g) Shoe bites
- (c) Do not forget the following in
  - (1) Toes
    - (a) Ingrowing toe nail
    - (b) Subungual exostosis
    - (c) Melanotic whitlow
    - (d) Bunion
  - (2) Fore-foot
    - (1) Morton's metatarsalgia
    - (2) March fracture
    - (3) Osteochondritis second metatarsal head
    - (4) Perforating ulcer
  - (3) Hind foot
    - (1) Kohler's disease navicular
    - (2) Sever's disease os calcis
    - (3) Calcaneal spur
    - (4) Mycetoma
    - (5) Guinea worm
  - (4) Leg
    - (1) Varicose veins
    - (2) Varicose ulcer
    - (3) Muscular gumma
    - (4) Sarcoma
      - (a) Muscular
      - (b) Bony
    - (5) Schlatter's disease tibial tubercle
  - (5) Knee
    - (1) Gumma ulcers or scars
    - (2) Bursitis
    - (3) Ganglion
    - (4) Baker's cyst
    - (5) Popliteal aneurysm
    - (6) Bone tumours
      - (a) Chondroma
      - (b) Osteoma
      - (c) Giant-celled
      - (d) Sarcoma
    - (7) Charcot joint
    - (8) Deranged knee

- (6) Thigh
    - (1) Saphenous varix
    - (2) Femoral aneurysm
    - (3) Arterio-venous aneurysm
    - (4) Femoral hernia
    - (5) Psoas abscess
    - (6) Ectopic testis
    - (7) Myositis ossificans of the adductors
  - (7) Hip
    - (1) Congenital dislocation
    - (2) Perthes disease ; osteochondritis
    - (3) Slipped epiphysis    coxa vara
-

## CHAPTER X

# THE INGUINAL REGION

### I DISEASES OF THE INGUINAL REGION

#### (A) THE SKIN AND SUBCUTANEOUS TISSUES

##### (1) Congenital

- Weakness of inguinal musculature
- ↓ Malgaigne's bulges

Compl Inguinal hernia

##### (2) Inflammations of the inguinal region

###### (A) Extravasation of urine

Eti Rupture urethra or bladder or ureter

Path (1) Superficial Subcutaneous  
(2) Deep Extrapertoneal

Clinic (1) Diffuse oedematous indurative swelling  
of the inguinal region stopping short along  
the Poupart  
(2) Other signs of urinary extravasation  
(3) Toxaemia

Diff diag (1) Elephantiasis  
(2) Cellulitis  
(3) Lymphadenitis  
(4) Funiculitis

Compl. (1) Urinary fistulae  
(2) Gangrene  
(3) Septicaemia

Treat (1) Urinary drainage  
(2) Multiple incisions and hypertonic packs

###### (B) Elephantiasis

Secondary to (a) Elephantiasis scrotum  
(b) Elephantiasis inferior extremity  
(c) Filarial lymphadenitis

###### (C) Secondary to :

(a) Lymphadenitis  
(b) Funiculitis  
(c) Strangulated hernia

##### (3) Ulcerations of the inguinal region

###### (A) Virulent bubo

Post lymphadenitic ulcer

###### (B) Sloughing phagedaenic chancre

Sloughing acutely spreading ulcer



- (C) **Granuloma inguinale**  
 Etio **Veneral disease**  
 Path **Chronic vascular granuloma**  
     **With deep formation of dense fibrous tissue**  
 Clinic (1) **Focus on penis or pudenda**  
       (2) **Red granulomatous mass**  
 Diff. diag (1) **Tertiary syphilis**  
           (2) **Malignancy**  
 Treat (1) **Curettage and cauter**  
       (2) **Excision**  
       (3) **Intravenous tartar emetic**  
            $\frac{1}{2}$  gr  $\rightarrow$  +  $\frac{1}{2}$  gr.  $\rightarrow$   $2\frac{1}{2}$  gr  
           **Every alternate day**
- (4) **Sinuses of the inguinal region**  
 (A) **Superficial Lymphadenitic**  
 (B) **Deep**  
   (1) **Fistulae**  
     (a) **Artificial anus**  
     (b) **Faecal fistulae**  
     (c) **Urinary fistulae**  
   (2) **Abscesses**  
     (a) **Iliac abscess**  
       (a) **Appendicular**  
       (b) **Pericæcal**  
       (c) **Diverticulitis**  
     (b) **Pelvic abscess**  
       (a) **Pyosalpinx**  
       (b) **Parametrial abscess**  
       (c) **Appendicular abscess**  
       (d) **Peritonitic abscess**  
     (c) **Psoas abscess**  
       (a) **Spinal caries**  
       (b) **Iliac caries**  
   (3) **Bones and joints**  
     (a) **Hip joint disease**  
     (b) **Iliac necrosis**  
     (c) **Pubic necrosis**  
     (d) **Femoral necrosis**  
   (4) **Special causes**  
     (a) **Actinomycosis**  
     (b) **Malignancy**
- (5) **New growths inguinal skin and sub-cut. tissues**  
   (1) **Lipoma**  
   (2) **Fibroma**  
   (3) **Lymphangioma**

**(B) THE INGUINAL LYMPH GLANDS****(1) Sepsis**

- Varieties** (A) **Acute septic / Acute bubo**  
 (a) Primary pyogenic septic focus  
 (b) Secondary pyogenic venereal focus  
     Sepsis + (a) Syphilis  
               (b) Soft chancre  
               (c) Gonorrhoea  
 (B) **Chronic septic Chronic bubo**  
 (a) Secondary to acute non-healing bubo  
 (b) Primarily chronic

**Etio Primary foci**

- (1) **Foot** Septic wounds, septic corns  
 (2) **Perineum and genitals**  
     (a) Pyogenic foci  
     (b) Venereal foci  
 (3) **Gluteal** Boils, carbuncles  
 (4) **Lower abdominal wall** Boils  
 (2) **Tuberculosis** Rare  
 (3) **Syphilis**  
     (a) Secondary to primary chancre septic  
     (b) Secondary syphilitic discrete multiple  
 (4) **Lymphadenoma**

**Path** Late stages of Hodgkin's disease

- Clinic** (a) All other glands enlarged  
 (b) Spleen enlarged.  
 (c) Fever bouts Pel-Ebstein.  
 (d) Anaemia  
 (e) Biopsy

**(5) Elephantiasis**

- (A) Lymphadenitis  
 (B) Lymphatic abscess

**(6) Secondary malignant**

- Etio** (A) **Carcinoma** Carcinomatous ulcer  
 (B) **Sarcoma**  
 (C) **Melanoma malignum** Melanotic whitlow  
**Primary foci** (a) Penis epithelioma  
 (b) Anus epithelioma  
 (c) Foot melanoma  
 (d) Leg sarcoma

**(C) THE SPERMATIC CORD****(1) Congenital**

- (A) Incompletely descended or misplaced testis

- Clinic (1) Small round swelling with testicular tenderness at  
 (a) Anterior superior spine  
 (b) Inguinal canal  
 (c) Pubic tubercle  
 (2) Testis absent in the scrotum.
- Compl Potential or actual hernia.
- Treat Orchloperxy + herniotomy
- (B) Inguinal hernia (See under Hernia)
- (C) Hydrocele (See under Hydrocele)
- (1) Processus vaginalis  
 (a) Congenital  
 (b) Infantile  
 (c) Encysted  
 (2) Canal of nuch  
 (3) Hernial sac
- (2) Inflammations of the cord Funiculitis
- (A) Torsion of the testis (See under Testis)
- Clinic Sudden acute epididymo-orchitis with ascending funiculitis
- Diff diag (1) Strangulated hernia  
 (2) Inflamed hydrocele
- Compl Gangrene of the testis
- (B) Septic funiculitis (See under Spermatic cord)
- Etio (1) Primary II coli urethritis  
 (2) Secondary To epididymo-orchitis  
 (3) Specific Tuberculous extension from  
 (a) Prostate → testis  
 (b) Testis → prostate
- Path (a) Primary  
 (b) Descending: testis → urethra  
 In (a) Torsion testis  
 (β) Tuberculous testis → prostate  
 (c) Ascending Urethra → testis  
 In (a) Urethritic gonorrhoeal  
 (β) Tuberculous prostate → testis
- (3) New Growths of the cord
- (A) Lipoma etiology of traction hernias
- (B) Fibroma
- (C) Lymphangioma diffuse hydrocele of the cord
- (D) Secondary to malignant testis
- (4) Special affections of the cord  
 (See under Spermatic cord)
- (A) Varicocoele Varicose pampiniform veins
- (B) Thrombosis of spermatic vein
- (C) Tuberculous infiltration of vas deferens

## (D) THE INGUINAL NERVES

## (1) Trauma

Etio **Herniotomies**  
**Appendicectomies**

Path (1) Division  
 (2) Contusion  
 (3) Inclusion in a suture leading to  
 (a) Paralysis  
 (b) Neuralgia

Clinic (A) Post-appendicectomy inguinal hernia  
 or (B) Ilio-inguinal neuralgia

## (2) New growth Neuro-fibroma

## (E) OTHER INGUINAL AFFECTIONS

- (1) Aneurysm of the (a) External iliac  
 (b) Femoral  
 (2) Psoas bursitis  
 (3) Femoral hernia  
 (4) Hip joint disease

## (II) SWELLINGS OF THE INGUINAL REGION

## (A) SOLID SWELLINGS

## (1) Enlarged lymph glands

Etio (a) Septic Bubo  
 (b) Tuberculous  
 (c) Syphilitic  
 (d) Malignant  
 (e) Lymphadenomatous  
 (f) Filarial

## (2) Hernia Omentocoele granular feel

- (A) Inguinal: (a) Above the Poupart  
 (b) Above and internal to pubic spine  
 (B) Femoral (a) Below the Poupart  
 (b) Below and external to pubic spine

(3) Incompletely descended testis Testicular feel  
 Scrotal examination

## (4) Tumours

(A) Skin and subcutaneous tissues lipoma  
 fibroma

(B) Cord lipoma  
 fibroma  
 lymphangioma  
 malignant infiltration

(C) Bones chondroma } of { ilium  
 osteoma } pubis  
 sarcoma } femur



(3) **Torsion of the testis**

- Clinic (a) History of strain or trauma  
 (b) **Acute epididymo-orchitis**  
 + (c) **Acute funiculitis**

(4) **Diffuse hæmatocele of the cord**

- Clinic (a) History of strain or trauma  
 (b) Irreducible diffuse swelling  
 (c) Superficial ecchymosis

(5) **Strangulated hernia**

- Clinic (a) History of hernia  
 (b) Inflammatory elongated swelling  
 (c) Peritoneal shock  
 + or (d) **Intestinal obstruction**

(b) *Slow and gradual onset*

- (1) **Hernia** Reducible  
 (2) **Lipoma of the cord** irreducible, lobulated  
 (3) **Diffuse hydrocele of the cord** lymphangioma  
 (4) **Malignant infiltration of the cord**  
 (5) **Hypertrophy of the cord**  
 Secondary to heavy testis

(B) **FLUID SWELLINGS**(1) **Hydrocele of**

- (a) **Cord**  
 (a) Congenital reducible  
 (b) Infantile irreducible  
       testis enveloped  
 (r) Encysted irreducible  
       testis separate  
 (b) **Canal of Nuck**  
 (c) **Hernial sac** obstructed hernia  
       inflamed hernia  
       strangulated hernia

(2) **Encysted hæmatocele of the cord**

Secondary To trauma of the encysted hydrocele of the cord

(3) **Acute abscess of the cord**

- Clinic (1) **Acute funiculitis**  
 ↓ (2) **Abscess along the cord**

(4) **Internal abscess** Travelling along the cord

- (A) **Iliac abscess**  
 (B) **Psoas abscess**  
 (C) **Pelvic abscess**

- Clinic (1) **Primary focus**  
 (2) **Two parts with communicable fluctuation**  
 (3) **Reducible**  
 (4) **Impulse**

## IMPORTANT POINTS

- (1) The most common inflammation in the inguinal region is lymphadenitis.
- (2) The most common causes of inguinal lymphadenitis are
  - (a) Sepsis from the foot
  - (b) Sepsis from the genitals : venereal
- (3) Most common sequela of inguinal bubo is non healing
- (4) Incisions ought to be vertical in inguinal buboes.
- (5) Do not forget filariasis in recurrent lymphadenitis in inguinal region.
- (6) Sepsis, syphilis and secondaries are the three main causes of inguinal gland enlargement.
- (7) The most common primary focus in secondary malignancy of inguinal glands : epithelioma penis.
- (8) An irreducible swelling in the inguinal region
  - (a) Lipoma of the cord
  - (b) Encysted hydrocele of the cord
  - (c) Irreducible hernia
  - (d) Mal-descended testis
  - (e) Enlarged lymph glands.
- (9) The most common inflammatory inguino-scrotal swellings
  - (a) Strangulated hernia
  - (b) Acute torsion of the testis
  - (c) Acute funiculitis.
- (10) Differential diagnosis between
 

(a) Thrombosed spermatic vein	
2 (b) Vas deferens	(a) Normal
	(β) Inflamed
	(γ) Beaded.
- (11) Septic funiculitis
  - ? (a) Primary
  - ? (b) Descending testis → urethra
  - ? (c) Ascending urethra → testis.
- (12) Deep cystic swelling in the inguinal region
  - ? (a) Psoas abscess
  - (b) Psoas bursitis
  - (c) Aneurysm.
- (13) Sinus in the inguinal region
  - ? (a) Urinary
  - ? (β) Faecal
  - ? (c) Bones Spine ilium pubis, femur
  - ? (d) Joints : Hip sacroiliac
  - ? (e) Lymph glands

- (14) The most common affections of the inguinal region
    - (a) Inguinal bubo
    - (b) Inguinal hernia.
  - (15) Referred pain in the inguinal area
    - ? (a) Renal or ureteral colic
    - ? (b) Ilio-inguinal neuralgia.
  - (16) Beware of bladder when a mass of fat is met with near the medial end of the inguinal canal.
-





**PART III**

**SYSTEMIC SURGERY**



# **THE CENTRAL NERVOUS SYSTEM**



## CHAPTER I

# THE BRAIN AND THE MENINGES

### (1) CONGENITAL ABNORMALITIES

#### (1) OMPHALOSITES

##### (A) Paracephalian

- (a) Rudimentary head formation
- + (b) Absence of other organs

##### (B) Acephalian : Complete absence of the head

#### (2) AUTOSITES Terato-encephalian

##### (A) Ex-encephalian : Incomplete develop. of skull vault

##### (B) Pseudo-encephalian

- (a) Incompletely developed vault
- + (b) Incompletely developed brain

##### (C) Anencephalian : Complete absence of vault and brain

#### (3) MICROCEPHALUS : Small skull and rudimentary brain

Clinic Idiots

#### (4) HYDROCEPHALUS

Def Accumulation of cerebrospinal fluid within the skull cavity

Etiol: (1) Congenital: Abnormalities

(2) Traumatic: Birth hæmorrhages

(3) Inflammatory: Meningitis:

(a) Septic

(b) Syphilitic

(c) Tuberculous

(4) Tumour Pressure

Path (A) Causes

(1) Excessive secretion

Choroidal hypertrophy

(2) Obstructive

(A) Intra ventricular

(a) Monroe

(b) Third ventricle

(c) Iter

(d) Mayendie

(e) Luschka

(B) Extra ventricular : Incisura tentorii

(3) Defective absorption

Clogged arachnoidal villi

- (B) **Varieties**
- (1) **Intra-ventricular**
    - (a) Congenital abnormalities
    - (b) Intracerebral hæmorrhage or tumour
    - (c) Basal meningitis
  - (2) **Extra-ventricular**
    - (a) Leptomeningitis with adhesions
    - (b) Clogged arachnoidal villi
    - (c) Intracranial tumours
- Varieties** (A) **Infantile**
- (a) Congenital abnormalities
  - (b) Birth hæmorrhage
  - (c) Syphilitic basal meningitis
- (B) **Adult :**
- (a) Leptomeningitis with adhesions
  - (b) Tumours
- Clinic** (1) Difficulty in birth
- (2) Deformity
- Big head with thin and separated bones**
- (3) Increased intracranial pressure
- (4) Idiotcy
- Invest** (1) Ventriculo-graphy
- (2) Ventricular or cistern aspiration
- (3) Injection of dye into lateral ventricle
- ↓ Lumbar puncture
- (a) If recovered extra ventricular
  - (b) If not recovered intra ventricular
- Treat** (1) **Tapping**
- (A) **Ventricles**
- (a) **Superior route**  
Through the lateral angles of anterior fontanelle
  - (b) **Posterior route**  
7 cms. above the ext. occ. process  
4 cms. lateral to mid line
  - (c) **Lateral route :**  
3 cms. above and behind and. mentus
- (B) **Cistern**  
Through atlanto-occipital ligament
- (2) **Drainage of lateral ventricles :**  
Silk, silver tube

- (3) **Drainage of cisterna magna** Into
  - (a) Sub-dural space
  - (b) Extra-dural space
  - (c) Sub-epicranial space
- (4) **Removal of choroid plexus**
- (5) **Ligature of both common carotids**

At the interval of three weeks

## (5) MENINGOCELE - ENCEPHALOCELE - HYDROENCEPHALOCELE

- Def** Congenital protrusion through a defect in the skull of
- (a) Pouch of dura mater meningocele
  - (b) Dural pouch with brain encephalocele
  - (c) Dural pouch with ventricle hydrocephalocele
- Sites**
- (a) Occipital
  - (b) Root of the nose
  - (c) Anterior fontanelle
  - (d) Mastoid
  - (e) Basal
    - (a) Lamina cribrosa
    - (b) Sphenoid
- Clinic**
- (1) Congenital tense, rounded, pedunculated cystic swelling over the site
    - (a) **Communicating** Reducible  
Impulse  
Young age
    - (b) **Non-communicating** Non reducible  
Non-impulsive  
Adult age
  - (2) Signs of increased intracranial tension on
    - (a) Reduction of contents
    - (b) Pressure on the swelling
  - (3) Translucency test
- Compl**
- (1) Trauma and rupture
  - (2) Ulceration
  - (3) Sepsis
  - (4) Deformity
  - (5) Idiocy
- Treat**
- (1) **Removal**

**Ind**

    - (a) Rapid enlargement
    - (b) Likelihood of complications
- Post. compl**
- (1) Hydrocephalus
  - (2) Raised intracranial tension
  - (?) Protection Palliative

## (6) INTRACRANIAL DERMOID

- Path** Contains sebum and hair
- Varieties**
- (a) Extra-dural  $\leftrightarrow$  extra-cranial
  - (b) Sub-dural





(4) **Unresolved contusion**

Intermittent intracranial tension symptoms

(5) **Softening and delayed secondary hæmorrhage**

(a) Latent period

↓ (b) Sudden tension signs

Clinic **Irritation syndrome**

(A) Extent (a) Local or focal

(b) General

(B) Time (1) Immediate

(2) Delayed

(3) Intermittent

(3) **TRAUMATIC CEREBRITIS**(A) **Local**

Path Around the contused or lacerated cortex

Clinic Focal cerebral irritation

(B) **General**

Path Edema of the whole brain

Clinic General cerebral irritation

(C) **Chronic Unresolved contusion**

Path Vicious circle

(a) Edematous contusion

↓ (b) Increased intracranial tension

↓ (c) Venous obstruction

↓ (d) Edema of the contusion = (a)

Clinic Chronic and recurrent cerebral irritation

(4) **INTRACRANIAL TRAUMATIC HÆMORRHAGE**(A) **Extra-dural**

Eti Rare

Source Middle meningeal artery

(a) Anterior branch

(b) Main trunk

(c) Posterior branch

(d) Venæ comites

Clinic (A) Latent period, 7 hours to 21 days

↓ (B) Slowly progressive pressure signs

(a) Extent (α) Local

↓ (β) Extending

↓ (γ) General

(b) Nature (α) Irritative

↓ (β) Paralytic

Prognosis Mortality 50%

(B) **Subdural**

Eti Common

Sites (1) Subdural Diffuse

(2) Subarachnoid Localised

- Sources (1) Large arteries diffuse and rapid  
 (2) Large veins or sinuses diffuse and rapid  
 (3) Cerebral veins or capillaries localised
- Varieties According to
- (1) Age
- (a) Senile
- Etio (a) Negligible trauma to the head  
 + (B) Senile shrinkage of the brain
- Path Chronic subdural haematoma
- Clinic Vague signs of increased tension
- (b) Adult
- Etio Pronounced trauma to the head
- Path Acute subdural haematoma
- Clinic Rapidly progressive increase in tension  
 (a) Generalised irritation syndrome  
 ↓ (b) Generalised paralysis syndrome
- (c) Juvenile
- Etio Difficult birth
- Path Acute or chronic subdural haematoma
- Clinic (a) New born babes  
 (b) History of difficult birth  
 (c) Convulsions → coma  
 (d) Fever  
 (e) Enlargement of head  
 (f) Fontanelle aspiration blood
- Treat (1) Bilateral fontanelle aspirations  
 Alternating sides daily  
 (2) Osteoplastic craniotomy  
 ↓ Clearing out the clot  
 (a) One side  
 ↓ (b) Other side
- (2) Rate of progress
- (a) Acute
- Etio Tearing of cerebral veins  
 Laceration of the brain
- Path Haematoma between dura and arachnoid
- Clinic Rapidly progressing signs of general compression  
 (a) Generalised irritation syndrome  
 ↓ passing rapidly into ↓  
 (b) Generalised paralysis syndrome
- (b) Chronic
- Etio Cerebral veins in seniles
- Path Tearing of veins due to brain shrinkage
- Clinic Vague chronic changing signs of increased tension

(3) **Site**

- (A) **Supratentorial** Anterior chamber synd.  
 (a) Unilateral  
 (b) Bilateral contre-coup  
 (B) **Subtentorial** Posterior chamber synd.

(4) **Time**

- (a) **Immediate** Primary  
 Concussion → compression  
 (b) **Reactionary** Within first week  
 Concussion → latent period → compression  
 (c) **Delayed** Spat-apoplexie

(5) **Extent**

- (a) **Diffuse**  
 Clinic Rapidly progressive widespread signs of compression  
 (b) **Spreading**  
 Clinic Signs of extradural hæmorrhage  
 (a) Without lucid interval  
 (β) With more rapid course  
 (c) **Localised**

(C) **Intra-cerebral**

- (1) **Primary** Traumatic  
 (2) **Delayed** Spat-apoplexie

(D) **Intra ventricular**

Clinic Rapidly progressive and pronounced signs of acute compression with high temperature

*Pathological effects of intracranial hæmorrhage*(1) **Compression** The effects depend on

- (A) **Site** (a) Psychic centres  
 (b) Motor centres  
 (c) Vital centres  
 (B) **Stage** (a) Irritative  
 (b) Paralytic  
 (C) **Area** (a) Local extradural  
 (b) Extensive subarachnoid  
 (c) General subdural  
 (D) **Progress** (a) Gradual extradural  
 (b) Rapid (a) Subarachnoid  
 (b) Localised subdural  
 (c) Immediate acute subdural  
 (d) Late but sudden Spat-apoplexie  
 (e) Chronic chronic subdural

(E) **Associated conditions** Contusion and laceration(2) **Septic** Intracranial sepsis

- (3) **Adhesions** (a) Hydrocephalus  
 (b) Epilepsy
- (4) **Traumatic cysts** (a) Cerebral  
 (b) Ventricular  
 (c) Meningeal

## (5) LATE SEQUELÆ OF INTRACRANIAL INJURIES

*Path. factors*

### (1) Chronic mild compression

- Causes* (a) Edema of the brain  
 (b) Unresolved contusion of the brain  
 (c) Chronic subdural hæmatoma  
 (d) Blood cysts

*Clinic* Chronic and intermittent signs of increased intracranial tension : chronic cerebral irritation

### (2) Adhesions

- (A) Meningeal hydrocephalus  
 (B) Cerebral epilepsy

### (3) Traumatic blood cysts

- Clinic* (a) Local irritative signs  
 + (b) General tension signs

### (4) Traumatic neurasthenia and psychosis

- Clinic* (a) Intermittent headaches  
 (b) Changes in temperament and personality  
 (c) Loss of memory and concentration  
 (d) Neuroses  
 (e) Insomnia → neurasthenia → insanity  
 (f) Automatic states  
 (g) Epilepsy

- Treat* (1) Full and prolonged rest  
 (2) Dehydration treatment  
 (3) Bromides and luminal  
 (4) Decompression  
 (5) Avoidance of sun constipation alcohol

*The clinical stages of intracranial injuries are*

### (1) CONCUSSION

*Cause* Momentary generalised hyperacute cerebral anæmia

- Clinic* (a) Instantaneous onset  
 (b) Simultaneously uniform widespread signs  
 (c) Widespread paralysis  
 Absence of slightest irritation  
 (d) Sudden and spontaneous recovery

### (2) REACTION

*Path* Slight rebound hyperæmia of the brain after concussion anæmia

- Clinic Very slight and temporary irritative symptoms
- (a) Headache and giddiness
  - (b) Vomiting
  - (c) Slight rise in temperature
  - (d) Full slow pulse

### (3) IRRITATION

Path (a) Early stage of any encroachment on intracranial space

- ↓ (b) Early stage of cerebral compression
- ↓ (c) Cerebral venous congestion
- ↓ (d) Irritation syndrome

Causes (1) Trauma hæmorrhage œdema fibrosis  
(2) Sepsis intracranitis abscess  
(3) New growths traumatic cysts

Clinic (1) Focal  
(2) Regional  
(3) General

Stages (1) Progressive To compression

Causes (a) Hæmorrhage  
(b) New growth

(2) Stationary With recurrence

Causes (a) Unresolved contusion  
(b) Chronic subdural hæmatoma

(3) Retrogressive Reaction stage

### (4) COMPRESSION

Causes (1) Congenital Hydrocephalus  
(2) Traumatic

- (a) Depressed bone
- (b) Extravasated blood
- (c) Cerebral œdema

(3) Sepsis

- (a) Meningitis
- (b) Encephalitis
- (c) Intracranial abscess

(4) Tumours

- (a) Traumatic cysts
- (b) Chronic abscesses
- (c) Syphiloma tuberculoma
- (d) New growths

Path (a) Later stage of any encroachment on intracranial space

- ↓ (b) Later stage of cerebral compression
- ↓ (c) Sustained spreading cerebral anæmia --
- ↓ (d) Paralysis syndrome

*Clinical syndrome factors*(1) **Progress**

- (A) Early and rapid acute subdural hæmorrhage
- (B) Late and slow
  - (a) Extradural hæmorrhage
  - (b) New growths
- (C) Late and rapid Spät-apoplexie
- (D) Intermittent and variable  
Chronic subdural hæmorrhage

(2) **Stages**

- (A) Focal Early stage  
Local hæmatoma abscess or tumour
- ↓ (B) Regional (a) Supratentorial
  - (a) Unilateral
  - (β) Bilateral
  - (b) Subtentorial
- ↓ (C) General Very late stage

(3) **Sites**

- (A) Cerebral
  - (a) Consciousness
  - (b) Mental qualities
  - (c) Motor system
  - (d) Special organs
- (B) Mid brain Pupils  
Heat regulation
- (C) Hind brain Bulbar signs  
Vital centres respiratory  
cardiac  
vasomotor
- (D) Cranial nerves

Irritation → paralysis of individual nerves

(See next page for Table)

*Special signs*(1) **Retrograde amnesia of Trotter**

: In concussion

Def Permanent and absolute lack of memory for the events at the time of the accident

(2) **Vasomotor reaction of Cushing:**

In late compression

In post-chamber syndrome

Def Fluctuations in B. P. with fluctuations in the brain activity due to periodic inactivity of the vasomotor centre caused by anæmia brought about by the increased intracranial pressure, alternating with periodic activity caused by auto-recovery of the centre due to anæmic stimulation.

[Contd on page 750]

Clinical features of the different states of Intracranial trauma

	Concussion	Reaction	Irritation	Compression
(1) Consciousness	slight giddiness to profound coma	conscious but apathetic	conscious but irritable to delirious	drowsiness to semi-consciousness to profound coma
(2) Motor	widespread paralysis with relaxation	Nil	(a) attitude of flexion (b) rigidity (c) convulsions	paresis ↓ paralysis
(3) Reflexes	absent	slightly exaggerated	exaggerated	absent
(4) Pupils	equal dilated sluggish	equal	equal contracted sluggish	(a) unequal ↓ (b) both dilated & fixed
(5) Sphincters	incontinence (paralytic)	—	incontinence (irritative)	incontinence (paralytic)
(6) Sensory	—	—	—	—
(A) Headache	—	slight	pronounced	—
(B) Vomiting	—	once	repeated	—
(C) Other sensory signs cannot be elicited or relied upon	—	—	—	—
(7) Bulbar	—	—	—	—
(A) Respiration	slow shallow	normal	slow deep	irregular shallow gasping, Cheyne Stokes
(B) Cardiac (Pulse)	weak rapid	full slightly slow	bounding slow	bounding → weak slow → rapid
(C) Vasomotor (B P)	fall	slight rise	profound rise	rise ↓ Cushing phenomenon ↓ fall



(b) C & I pressure normal or raised

**(B) Acute small**

- (a) Characters of extradural hæmorrhage
  - (α) Without lucid interval
  - (β) More rapid course

↓ (b) Long cerebral irritation period

↓ (c) Sudden signs of local compression

**(C) Chronic subdural**

(a) Old age

(b) Slight injury

(c) Long prodromal period

(α) Group one headache + mental changes

(β) Group two brain tumour syndrome

(1) Headache

+ (2) Localising phenomena

(γ) Group three

(1) Bad headache

+ (2) Mental aberrations

↓ (d) Perplexing alternation between signs.

(α) Irritative and paralytic

(β) Appearance and disappearance of reflexes

(γ) Coma and consciousness

↓ (e) Sudden extensive paralytic signs

(f) Dural exploration Dark blue dura

Tech (a) Exploratory drill holes

1 Bilateral parieto-occipital

4 cms. lateral to midline

10 cms. above ext. occ. process

(3) Inspection of the dura dark blue

Treat (γ) Puncture of the capsule

(δ) Aspiration of the hæmatoma

**(D) Delayed hæmorrhage Spät-apoplexie**

(a) Head injury with contusion of the brain

(b) Latent period of weeks or months

(c) Sudden and unheralded signs of acute compression after straining

**(E) Supratentorial hæmorrhage**

(a) Cerebral signs Irritative → Paralytic

(α) One hemisphere

↓ (β) Both hemispheres

↓ (b) Bulbar symptoms

**(F) Subtentorial hæmorrhage**

(a) Bulbar symptoms early

(α) Slow and stertorous respirations

(β) High blood pressure with slow pulse

(γ) Vomiting

(δ) Cheyne-Stokes phenomena

↓ (b) Death without coma or cerebral symptoms

*Contd from page 748]*

- Path (a) Increased intracranial pressure  
 ↓ (b) Anaemia of vasomotor centre  
     (a) Fall in B P  
     (β) Inactive brain  
 ↓ (c) Anaemic stimulation of the centre  
     (a) Rise in B P  
     (β) Active brain  
 ↓ (d) More haemorrhage → increased intracranial press.  
     and so on the phenomenon depending on the  
     continuous fight between  
     (a) Intracranial pressure anaemia  
     (β) Anaemic stimulation of vasomotor centre
- (3) Cheyne-Stokes syndrome ← Cushing reaction
- Def Rhythmic alteration of periods of inactivity and activity of the brain due to alternating failure and recovery of the cerebral circulation due to vasomotor reaction of Cushing
- Clinic (a) Consciousness × unconsciousness  
     (b) Motor irritation × motor paralysis  
     (c) B. P rise × B. P fall  
     (d) Deep respirations × shallow or absent resp.

*Different clinical syndromes in Intracranial haemorrhage*

- (1) Extradural:
- (a) Fracture or oedematous contusion in temporal fossa
  - (b) Lucid interval: 7 hours to 21 days
  - (c) Slow progress
    - (a) Irritation → paralysis
    - (β) Focal → regional → general
  - (d) Inequality in signs on both sides
- (2) Subdural
- (A) Acute extensive
    - (a) Severe fracture skull
    - (b) No lucid interval
    - (c) Very rapid progress:
      - From irritation to paralysis
      - From local to general
    - (d) Extensively widespread nature of signs
    - (e) Variations between consciousness and stupor
    - (f) Pulse rate below 60
    - (g) Dilated pupils
    - (h) Spinal puncture
      - (a) C. & f. bloody = bad prognosis
      - clear = good prognosis if operated upon
    - (β) C. & f. pressure normal or raised

**(B) Acute small**

- (a) Characters of extradural hæmorrhage
  - (a) Without lucid interval
  - (β) More rapid course

↓ (b) Long cerebral irritation period

↓ (c) Sudden signs of local compression

**(C) Chronic subdural**

(a) Old age

(b) Slight injury

(c) Long prodromal period

(a) Group one : headache + mental changes

(β) Group two : brain tumour syndrome

(1) Headache

+ (2) Localising phenomena

(γ) Group three

(1) Bad headache

+ (2) Mental aberrations

↓ (d) Perplexing alternation between signs.

(a) Irritative and paralytic

(β) Appearance and disappearance of reflexes

(γ) Coma and consciousness

↓ (e) Sudden extensive paralytic signs

(f) Dural exploration : Dark blue dura

Tech (a) Exploratory drill holes

: Bilateral parieto-occipital

4 cms. lateral to midline

10 cms. above ext. occ. process

(β) Inspection of the dura : dark blue

Treat (γ) Puncture of the capsule

(δ) Aspiration of the hæmatoma

**(D) Delayed hæmorrhage : Spat-apoplexia**

(a) Head injury with contusion of the brain

(b) Latent period of weeks or months

(c) Sudden and unheralded signs of acute compression after straining

**(E) Supratentorial hæmorrhage**

(a) Cerebral signs : Irritative → Paralytic

(a) One hemisphere

↓ (β) Both hemispheres

↓ (b) Bulbar symptoms

**(F) Subtentorial hæmorrhage**

(a) Bulbar symptoms : early

(a) Slow and stertorous respirations

(β) High blood pressure with slow pulse

(γ) Vomiting

(δ) Cheyne-Stokes phenomena

↓ (b) Death without coma or cerebral symptoms

*Diagnosis of intracranial hæmorrhage*

- (1) Indirect evidence
  - (A) History of trauma nature severity direction
  - (B) Presence of fracture skull
- (2) Direct evidence
  - (A) Nature of the lesion
    - (a) External evidence
      - (α) Safety valve hæmatoma
      - or (β) Local boggy
      - with (γ) Absence of local signs of external violence
    - (b) Lumbar puncture
      - (α) Normal fluid
        - (1) Extradural
        - (2) Subdural
        - (3) Local subarachnoid
      - (β) Bloody fluid diffuse subarachnoid
      - (γ) High pressure increased tension
    - (c) Cerebral involvement
      - (α) Onset immediate or delayed
      - (β) Progress slow or rapid
      - (γ) Extent stationary or increasing
  - (B) Side of the lesion
    - (a) Focal signs
    - (b) Opposite to motor affections
    - (c) Same as that of advanced pupil

*Differential diagnosis of traumatic hæmorrhagic compression*

- (1) Narcosis
  - (A) Opium
  - (B) Alcohol
- (2) Toxic states
  - (A) Uræmia
  - (B) Diabetic coma acetonaemia
  - (C) Sunstroke
- (3) Non traumatic cerebral compression
  - (A) Circulatory: Thrombosis apoplexy embolism
  - (B) Sepsis Meningitis cerebritis abscess
  - (C) Tumours
    - New growths specific cysts aneurysms
  - (D) Hydrocephalus

*Diagnosis of hemiplegia in a comatose patient*

- (A) Face
  - (α) Smoothened side
  - (β) Drooping of the oral angle
  - (γ) Puffing cheek
- (B) Motor
  - (α) Flaccidity
  - (β) Inability to participate in involuntary movements

## (C) Reflexes

- (a) Abolition of abdominal reflexes
- (β) Exaggeration of deep reflexes
- (γ) Babinski and ankle clonus present

## (D) Bulbar

- (a) Cushing's phenomena
- (β) Cheyne-Stokes phenomenon
- (γ) Non-participation by affected limb in the involuntary stereo-typed movements of Cheyne-Stokes syndrome

**Birth intra-cranial injuries**

Etiol: Difficult birth

Path: Cerebral

- (a) Congestion
- (b) Contusion
- (c) Edema
- (d) Hemorrhage
  - (a) Tear of longitudinal sinus
  - (β) Tear of subcortical veins

Clinic (a) Difficulty in birth  
 (b) Respiratory difficulties → attacks of cyanosis  
 (c) Somnolence alternating with restlessness  
 (d) Recurrent vomiting  
 (e) Muscular twitchings → convulsions  
 (f) Bulging fontanelles

Treat (1) Absolute rest  
 (2) Injection of 10 c.c.s. of mother's blood  
       Intra muscular  
 (3) Rectal hypertonic Every 4 hours  
       (a) 3 ounces of 10% saline  
           (1½ teaspoonful of salt in 3 ounces of water)  
       + (b) Chloral hydrate gr ½  
 (4) Subtemporal decompression

*Prognosis of intracranial traumatic conditions*

Bad, if

- (1) Progressive loss of consciousness
- (2) Restlessness
- (3) Rapid pulse
- (4) Pyrexia
- (5) Rapid and profound pupillary changes
- (6) Rapid progress in degree and extent of motor signs

*Treatment of different clinical syndromes of intra-cranial injury*

(1) Concussion Treatment of shock + Observation

- (1) Rest in bed in horizontal position  
       For three weeks at least in a pronounced case

(2) Cold to the head and warmth to the body

(3) **Observation Report if**

(a) Temperature rises above  $100.5^{\circ}$

(b) Pulse rate: (a) Below 60  
(b) Above 130

(c) Irregular or stertorous respirations

(d) Unequal pupils

(e) Convulsions

(f) Paralysis

(g) Repeated vomits

(II) **Reaction Rest + Purge + Observation**

Ind Headach + giddiness + vomiting + slight fever

Treat (1) Complete rest  
(2) Cold to the head  
(3) Saline purge  
(4) Sedatives  
(5) Observation (See above)

After treat (1) Convalescence for 3 weeks  
(2) Resumption of active life after two months

(III) **Irritation: (A) (Rest + Dehydration + Observation)**  
↓ (B) Decompression

Ind (1) Increased intra-cranial pressure syndrome  
Appearing after 48 hours

(2) Signs of irritation brain  
Persisting for more than 48 hours

Clinic (1) Severe persistent headache with vomits  
(2) Irritability of mind and body  
(3) Slow bounding pulse with fever

Treat (1) Rest Isolation in a darkened room  
(2) Sedatives Oral and rectal  
Aspirin phenacetin caffeine, bromides chloral  
(3) Dehydration

(A) Oral:

(a) NaCl in keratin capsules

(b) Purges mag. sulph.  
croton oil  
calomel

(c) Restriction of fluids to two pints per day

(B) Rectal 50% mag. sulph.

Mag sulph. ounces III

Paraldehyde drachms IV

Aqua ounces VI

Every 4 hours for one week

**(C) Intravenous**

- (a) 50-100 c.c. of 15-30% NaCl
- (b) 50-100 c.c. of 50% glucose
- (c) 200-300 c.c. of 50% sucrose

**(D) Lumbar puncture**

- Ind Diagnostic
- Therapeutic

Compl Medullary cone strangulation

**(4) Decompression**

- Ind (a) Compression within first 48 hours
- (b) Irritation → compression
- (c) Prolonged irritation  
In spite of conservative treatment
- (d) Relapse of tension signs  
After apparent recovery
- (e) Chronic, intermittent, recurring tension

- Compl (1) Lung complications pneumonia  
(2) Urinary complications cystitis  
(3) Brain complications delirium, apathy

**(IV) Compression Decompression**

- Ind (a) Compression signs within first 48 hours
- (b) Progressive tension signs
- (c) Chronic recurrent persistent tension signs

- Clinical Ind (1) Lucid interval  
More its length better the prognosis
- (2) Slow progress
- (a) Extent  
Focal → local → regional → hemispherical → anterior chamber → medullary
  - (b) Degree Irritation → paralysis
- (3) Unequal signs on both sides
- (a) Pupils advanced on same side
  - (b) Spasms
  - (c) Paralysis
- } lesion on opposite side
- (4) High blood pressure + slow pulse below 60
- (5) No onset of bulbar signs
- Path. ind (1) Depressed fracture
- (2) Extra-dural hæmorrhage
- (3) Subdural hæmorrhage
- (a) Local and not too severe
  - (b) Chronic
- (4) Unresolved contusion  
Chronic, intermittent tension signs
- (5) Spät-apoplexie



## Time of interference

- (1) Persistent or progressive irritation syndrome
- (2) Appearance of paralytic signs
- (3) Appearance of unequal pupils
- (4) Before the fall of blood pressure

## Contraindications

- (1) Extremely severe and rapidly progressive case
  - (2) General deformation fractures of the skull base
- with
- (a) No compression signs
  - (b) No prolonged irritation signs

## Tech

## (1) Anaesthesia

- (a) Regional novocain
  - (b) General ether (Med. Ann. 1940)
- Advantage* obliteration of cranial cavity due to post anæsthetic oedema of the brain

## (2) Trephining

## (A) Places

- (a) Over the suspected region
  - (a) Clinical signs
  - (b) External injuries
  - (r) History
- (b) Over the contre-coup region
- (c) Classical
  - (a) Temporal
  - (b) Occipital

## (B) Objects

- (a) Exploration and evacuation of
  - (a) Haematoma
  - (b) Foreign body
- (b) Control of further bleeding
- (c) Relief of tension due to
  - (a) Depressed fracture
  - (b) Haematoma
  - (r) Oedema of the brain

## (3) Control of bleeding (See under Operations)

## (4) Dural incision :

- Ind
- (a) Dural tension
  - (b) Dural discolouration
  - (c) Absent cerebral pulsation

- Contraind
- (a) Extra-dural sepsis
  - (b) No compression signs

## (5) Treatment of dura

- (a) Unperforated + no compression  
Do not open

- (b) Unperforated + outside sepsis :  
Do not open
- (c) Unperforated + compression open
- (d) Compression + subdural sepsis open
- (e) Perforated + no compression suture
- (f) Perforated + sepsis do not suture
- (g) Subdural compression } balance  
+ Extra-dural sepsis }

(6) Treatment of hæmatoma

(A) Evacuation of hæmatoma by

- (a) Irrigation
- (b) Suction
- (c) Aspiration
- (d) Scoop

(B) Control of the source

(a) Extra-dural hæmorrhage

Source	Middle meningeal
	(a) Anterior branch
	(b) Main trunk
	(c) Posterior branch
	(d) Venæ comites
Tech	(1) Incisions (1) Horse shoe (2) Vertical
	(2) Temporal split vertical
	(3) Trephine
	(a) Anterior branch
	2 behind ext. ang. pro.
	2 above the zygoma
	(b) Posterior branch
	5 above and behind the
	Darwin's tubercle, with
	pinna lying flat against
	the skull

(b) Subdural hæmorrhage

- Tech (1) Anæsthesia local
- (2) Trephine Two burr holes
- (a) 5 above ext. occ. process
- + (b) 1.5 lateral to midline
- + (c) On either side
- (3) Inspection of dura
- (a) Bulging
- + (b) Plum-coloured
- (4) Treatment of hæmatoma
- (a) Incision of the dura
- + (b) Suction or aspiration  
Of the blood
- + (c) Turn out the clot

- (c) **No-haematoma + compression :**  
 Tech (1) **Explore brain & ventricles**  
           By aspiration  
 ↓ (2) **Enlarge trephine hole**  
       along (a) Anterior branch  
               Fronto-parietal  
               (b) Middle branch  
               Temporo-parietal  
               (c) Posterior branch  
               Parieto-occipital  
 ↓ (3) **Contre-coup trephine**  
 = (4) **Palliative large bilateral**  
       trephine holes

*Treatment . Of untoward signs and symptoms*

(A) *During the first 48 hours*

- (1) **Blood or cerebrospinal fluid oozing**
  - (a) Mop with sterile gauze
  - (b) Do not plug or plug lightly
  - (c) Urotropine & sulphonamide therapy
- (2) **Respiratory embarrassment**
  - (a) Lateral position
  - (b) Coleman's postural drainage  
       Raise the foot of the bed about 15
- (3) **Restlessness and delirium**
  - (a) Paraldehyde or bromides per rectum
  - (b) Sodium luminal 5 grs : intravenous
  - (c) Hyoscine
- (4) **Signs of compression : Decompress**

(B) *After the first 48 hours*

- (1) **Persistence of unconsciousness**
  - (a) Stomach feeds  
       600 c.ca. of mixture of eggs + milk + sugar  
       T D S
  - (b) Dehydration  
       Intravenous 200-300 c.ca. of 50% sucrose  
       : Every 6 hours
- (2) **Cerebral irritation**  
       (See the treatment of irritation)
- (3) **Lung complications**   Anti pneumonia treatment

(V) **Sequelae**

(1) **Unresolved contusion**

Etio   Incomplete convalescence from head injury

Path   Vicious circle

- (a) Oedematous contusion
- ↓ (b) Rise in intracranial tension
- ↓ (c) Venous obstruction → congestion
- ↓ (d) Oedema of the contusion

- Clinic (a) Recurrent throbbing headache  
 (b) Irritability
- Treat (1) Conservative dehydration + sedatives  
 (See under Irritation)
- ↓ (2) Decompression
- (2) Traumatic epilepsy (See under Epilepsy)

### (III) INTRACRANIAL INFECTIONS:

- Etio (1) Direct implantation  
 Septic compound fracture
- (2) Extension from a neighbouring focus  
 (a) Cranial focus  
 Mastoiditis, sinusitis, osteomyelitis  
 (b) Extracranial focus Facial carbuncle
- (3) Blood-borne Pyæmic metastases

#### (1) ACUTE MENINGITIS

- Etio (1) Compound fracture skull
- (2) Cranial sepsis  
 (a) Otitis media  
 (b) Sinusitis  
 (c) Osteomyelitis skull
- (3) Blood-borne  
 (a) Meningo-coccal  
 (b) Pneumo-coccal  
 (c) Tuberculous

- Bact (1) Meningo-coccal  
 (2) Pneumo-coccal  
 (3) Pyococcal  
 (4) Tuberculous

- Types (A) Local focal signs
- (B) Diffuse general irritation signs  
 (1) Acute  
 (2) Subacute  
 (3) Chronic  
 (4) Specific

- Clinic (1) Focal signs  
 Spasms, twitchings, convulsions, squint pupil changes, abnormal reflexes
- (2) General intracranial tension signs  
 Of cerebral irritation
- (3) Acute septic toxæmia
- (4) Lumbar puncture  
 (a) Pressure +  
 (b) Macroscopical exam turbidity  
 (c) Microscopical exam.  
 (d) Cultural exam.

- Treat: (1) Symptomatic: Sedatives  
 (2) Repeated cistern or lumbar punctures  
 (3) Antiseptics: Urotropine, sulphanilamide  
 (4) Antisera

## (2) EPIDURAL OR EXTRA DURAL ABSCESS

Etio Extension from a local lesion

- (1) Intracranial Sinus thrombosis  
 (2) Cranial  
 (a) Septic compound fracture  
 (b) Local cranial sepsis  
 (3) Extracranial Boil carbuncle

Path Pott's puffy tumour

- (a) Collection of pus between dura and bone  
 + (b) Osteomyelitis of overlying bone  
 + (c) Inflamed and oedematous overlying scalp

Types (a) Acute

- (b) Subacute  
 (c) Chronic

Clinic (1) Compression

- (a) Focal Irritation → paralysis  
 (b) Regional Irritation  
 (c) General: Cerebral irritation

(2) Sepsis

- (a) Local causative focus  
 (b) General toxæmia

(3) Pott's puffy tumour

Comp (1) Meningitis

- (2) Cerebral abscess  
 (3) Sinus thrombosis  
 (4) Intracranial compression

Treat (1) Operation

- (a) Trephine  
 ↓ (b) Excision of the overlying bone  
 ↓ (c) Evacuation of pus  
 ↓ (d) Drainage

(2) Antiseptics

(3) Symptomatic

## (3) SINUS PHLEBITIS AND THROMBOSIS

Etio Local suppurative focus → vein thrombosis → sinus thrombo-phlebitis:

- (1) Otitis media → lateral sinus  
 (2) Carbuncle face → cavernous sinus  
 (3) Nasal sepsis → superior longitudinal sinus  
 (4) Scalp sepsis → emissary vein thrombosis → sinus thrombo-phlebitis

Path (1) Local suppurative focus

- ↓ (2) Emissary vein thrombosis and phlebitis

## ↓ (3) Sinus

- (a) Phlebitis
- ↓ (b) Thrombosis
- ↓ (c) Suppuration
- ↓ (d) Embolism
- ↓ (e) Septicæmia

- Clinic (1) **Acute general sepsis :**  
 Rigors + high temperature
- (a) Septicæmia
  - (b) Pyæmia
  - (c) Toxæmia
  - (d) Septic embolism
- (2) **Intracranial signs**
- (A) **Focal and regional**  
 Meningitis and encephalitis
    - (a) Lateral sinus posterior basal signs
    - (b) Cavernous sinus eye signs
      - (a) Proptosis
      - (β) Chemosis
      - (γ) Ophthalmoplegia
    - (c) Superior longitudinal sinus  
 Inferior extremities signs
  - (B) **General tension :**
    - (a) Irritative
    - ↓ (b) Paralytic
- (3) **Local signs**
- (A) Signs of causative septic focus  
 Otitis, sinusitis, carbuncle
  - (B) Linear inflammation or chain of subcutaneous abscesses  
 Over the line of the affected sinus
  - (C) Hard, tender cord like vein jugular

*Individual signs*

- (1) **Lateral sinus**
  - (a) Posterior basal signs
  - (b) Jugular vein thrombosis
- (2) **Cavernous sinus**  
 Ophthalmic signs
- (3) **Superior longitudinal sinus**  
 Motor cortex signs

*General*

- signs* (1) Intra-cranial tension signs
- (2) General sepsis signs

- Compl (1) **Septic**
- (A) Intra-cranial spread
  - (B) Extra-cranial spread
  - (C) Septic embolism lungs
  - (D) Septicæmia, pyæmia, toxæmia

- (2) **Compression :** General intra-cranial tension
- Treat (1) Prophylactic**
- Ind Presence of a septic focus in the draining area with ascending oedema
- Tech (a) **Ligature of the afferent vein**  
Between the septic focus and the sinus  
+ (b) Delicate handling of the primary focus
- (2) **Therapeutic Exploration → Drainage**
- Ind (A) Presence of a primary septic focus  
+ Rigors with oscillating temperature  
(B) After the treatment of primary septic focus  
(1) Persistence of high temperature  
or (2) Appearance de novo of high temperature  
(C) During the operation for primary focus  
(1) Thrombosis of emissary vein  
(2) Perforation or discolouration or inflammation of intervening bone  
(3) Pus between the bone and the sinus  
(4) Appearance of the sinus  
(a) Absence of respiratory pulsations  
(b) Granulations lining the sinus wall  
(c) Absence of hæmorrhage on incision into the sinus wall
- Tech (1) **Ligature of efferent vein**  
(a) Lateral sinus  
Right or left int. jugular vein  
(b) Sup. long sinus Right int. jugular vein  
(2) **Thorough exposure of the sinus :**  
By excision of the overlying bone  
(3) **Treatment of the sinus :**  
(a) Incision  
↓ (b) Curettage  
↓ (c) Packing  
(4) **Drainage of the sinus :**  
(a) Local  
(b) Orbital in cavernous sinus  
Eagleton's combined operation  
(a) Common carotid ligature  
+ (β) Enucleation of eyeball  
(c) Jugular in  
(α) Lateral sinus  
(β) Sup. long sinus rt. jugular
- After treat (1) Dressings**  
(a) Primary septic focus  
(b) Sinus drain  
(2) **Antiseptics** Intravenous sulphonamides  
intravenous iodine  
intravenous dyes

(4) **ABSCCESS OF THE BRAIN:** (See under Ear also)

Def Suppurative softening of the brain

- (a) Local with definite capsulation
- (b) Regional with indefinite wall
- (c) General spreading cerebritis

Etio (1) **Traumatic abscess**

Compound septic fracture skull

(2) **Extension abscess**

- (a) Orogenic
- (b) Sinusitic
- (c) Osteomyelitis skull
- (d) Intracranial sepsis

(3) **Pyæmic abscess**

- (a) Bronchiectasis
  - (b) Lung abscess
  - (c) Empyema
- } Thoracic sepsis

Path (1) Primary focus

↓ (2) Extension to the brain via

- (a) Direct spread
- (b) Venous spread
- (c) Lymphatic spread

↓ (3) Cerebral sepsis

Strictly localised encapsuled abscess

↓ Diffuse acute cerebral softening

Types (A) **Acute spreading cerebritis**

Acute meningeal syndrome

(B) **Subacute abscess**

Rapid intracranial compression syndrome

(C) **Chronic abscess**

Cerebral tumour syndrome

Clinic (A) **Sepsis syndrome**(1) **General**

High intermittent or remittent fever

Rigors

Septic embolism

Septicæmia, toxæmia

Wasting &amp; cachexia

(2) **Local Inflammation of**

(a) Primary focus

(b) Overlying tissues

(B) **Compression syndrome**(1) **Acute meningitis and cerebritis**

Rapid general irritation → compression

(2) **Subacute cerebral compression**

(a) Slow cerebration

(b) Severe localised headache



- (c) Vomiting
- (d) Optic neuritis
- (e) Slow pulse
- (f) Subnormal temperature

(3) **Chronic Cerebral tumour syndrome**

(C) **Focal syndrome**

(1) **Frontal Silent area**

- (a) No focal signs
- (b) Slow cerebration

(2) **Temporo-sphenoidal**

- (a) **Eye signs** Pupillary signs  
Ptosis

- (b) **Motor signs** Hemiplegia  
Monoplegia

- (c) **Special signs** Auditory disturbances

(3) **Cerebellar**

- (a) **Cranial nerve affections** 5th to 12th

- (b) **Pons**

Spastic paralysis of opposite side

- (c) **Cerebellar**

- (a) **Ocular :**

- (1) Nystagmus
- (2) Weak conjugation
- (3) Skew deviation

- (β) **Neck :** Rigidity

- (γ) **Limb :**

- (1) Incoordinated movements

- (i) Ataxia
- (ii) Hypermetria
- (iii) Dysidiadochokinesis

- (iv) Component resolution of compound muscular action

- (2) Homolateral hypotonic paresis

- (3) Irregular reflexes

- (δ) **Catalepsy**

- (ε) **Vertigo with staggering**

- Diagnosis**
- (1) Presence of a local septic focus
  - (2) Acute or chronic general sepsis
  - (3) Intra-cranial compression syndrome
  - (4) Focal syndrome
  - (5) Lumbar puncture cautious
  - (6) Ventriculography

**Compl** (1) **Sepsis :**

- (a) Intracranial acute meningitis
- (b) General septicaemia, septic embolism

(2) **Compression**

**Sequelæ** (1) **Hernia cerebri**

**Treat** (a) Dehydration therapy  
(b) Lumbar punctures repeated

(2) Epilepsy

(3) Insanity or idiocy

**Treat** (A) **General Sulphonamide therapy**

(B) **Local: Exposure → exploration**  
↓ **Evacuation → drainage**

**Time** Definite capsulation 3 weeks

**Route** (a) **Along the primary focus**

(b) **Direct**

At its nearest approach to the surface

(a) **Temporal**

75° above supra meatal spine

(β) **Occipital**

(1) 1.5 behind meatal centre

+ (2) 1" below Reid's base line

**Tech** (1) **Dandy's method Aspiration**

Exposure → Aspiration

(2) **Drainage classical**

Exposure → Evacuation → Drainage

(3) **King's method Capsulectomy**

(a) **Wide approach**

↓ (b) **Removal of overlying cortex**

↓ (c) **Removal of the overlying capsule**

↓ (d) **Evacuation of the pus**

↓ (e) **Irrigation of the cavity**

↓ (f) **Inspection of the cavity**

↓ (g) **Iodoform gauze pack**

(4) **Marsupialisation**

(a) **Trophine hole 1.5 diam over the abscess**

(b) **Radial incision of the dura**

(c) **Removal of overlying cortex**

(d) **Aspiration of the pus through the capsule**

(e) **Suture of the capsule to galea**

(f) **Wide incision of the capsule**

(g) **Gauze drain**

(5) **Excision of the abscess in toto**

*Indications for opening the dura*

(1) **Signs of subdural tension**

(2) **Signs of subdural sepsis**

**Post. Compl** (1) **Spreading encephalitis**

(2) **Septic meningitis**

(3) **Edema of the brain**

(4) **Infarction pneumonia**

**(IV) INTRACRANIAL TUMOURS**

Def Tumour syndrome

A slowly progressive intracranial lesion

Etio Age (A) Childhood and adolescence

(B) Between 40 and 60

Varieties

**(A) CYSTS****(a) Congenital****(1) Dermoids**(a) Extra-dural  $\longleftrightarrow$  extracranial

(β) Subdural

**(2) Meningoceles** (See page 741)

(a) Meningocele

(β) Encephalocele

(γ) Hydrencephalocoele

Clinic Congenital protrusion of intracranial contents through a cranial defect

**(b) Traumatic****(1) Encapsuled haematoma****(2) Haemorrhagic cyst**

(a) Meningeal

(β) Intra-cerebral

(γ) Ventricular

**(3) Aerocele****(c) Inflammatory** Localised serous meningitis

Etio Otitis media

Site Subdural in posterior chamber

**(d) Parasitic**

(1) Cysticercus

(2) Echinococcus

**(e) New growths**

(1) Gliomatous cyst

(2) Degeneration cyst

**(B) ANEURYSMS****(a) Cerebral arteries**

Sites (a) Circulus arteriosus

(β) Lenticular

Etio Congenital childhood

Compl Rupture

(a) Headache

↓ (b) Sudden intracranial compression

↓ (c) Bloodstained cerebrospinal fluid

Diff diag Sunstroke

**(b) Internal carotid** (See under Aneurysms)

(a) Spontaneous arterial

Etio Syphilis

Clinic (a) Eye signs paralysis, proptosis

(b) X Rays bone erosion

(β) **Arterio-venous**

Etio Fracture skull

Clinic (a) Eye signs pulsating exophthalmos  
ophthalmoplegia

(b) Bruit audible

Treat Ligature of ext. and int. carotid art.

(C) **CHRONIC GRANULOMAS AND INFECTIONS**

(a) **Tuberculoma**

Etio Young age

Site Posterior fossa subcortical

Clinic (a) Localising signs

(b) General tension signs

Compl Tuberculous meningitis

Treat (1) Complete excision

Avoid partial excision or biopsy

(2) Palliative decompression

(b) **Syphiloma**

Path (a) Cerebral gumma

(β) Meningeal gumma

(γ) Diffuse arachnoiditis hydrocephalus

(c) **Chronic abscess**

(a) Frontal

(β) Temporal

(γ) Cerebellar

(D) **NEOPLASMS**

(a) **Skull**

(1) Ivory exostosis or osteoma

Vault and air sinuses

(2) Primary osteo-sarcoma

Periosteal and central

(3) Secondary sarcoma or carcinoma

Primaries (a) Thyroid

(β) Kidney Sarcoma in children

(γ) Breast

(δ) Prostate

(b) **Meninges**

(1) Benign endothelioma Meningioma

Etio Adults

Path Origin in arachnoidal villi

Slow encapsuled growth

Involvement of dura and bone

Sites (1) Para-sagittal:

Associated with large venous sinuses

- (2) **Basal** Basal fossae of the skull  
 (a) Anterior  
 (β) Temporal  
 (γ) Posterior
- (3) Surface of the brain
- (4) Falx cerebri
- Clinic** (1) *Focal cerebral dysfunction*  
 Slowly progressive
- (2) *Intracranial compression*  
 Slow or rapid
- (3) *Cranial changes*  
 (a) New bone formation  
 (b) Bone destruction  
 (c) Asymmetrical arrangement of cranial vessels
- Cerebral syndrome** (1) *Anterior syndrome*  
 (a) Psychic disturbances  
 (b) Double papilloedema
- (2) *Middle syndrome*  
 (a) Sensory  
 (b) Motor
- (3) *Posterior syndrome*  
 (a) Sensory disturbances  
 (b) Contralateral homonymous hemianopia
- Treat** Radical removal
- Contraind** (a) Vascularity  
 (b) Inaccessibility
- (2) **Pssammoma** : Calcified endothelioma
- (3) **Cholesteatoma** :  
 Congenital subarachnoid tumour
- (4) **Malignant endothelioma** : Local malignancy
- (5) **Secondary carcinomatous deposits**
- (6) **Melanomatous deposits**
- (a) **Nerves** (See under Nerves)
- (1) **Auditory neuro-fibroma**  
**Etiol** Von Recklinghausen's disease  
**Site** Cerebello-pontine angle  
**Path** Lobulated, capsulated benign slow fibroma of the auditory nerve sheath  
 (a) Primary solitary  
 (b) Secondary to Von Recklinghausen
- Clinic** (1) *Progressive auditory signs*  
 (a) Unilateral deafness  
 (β) Tinnitus  
 (γ) Vertigo

- (2) Suboccipital pain
- (3) **Cerebellar signs**
- (4) Nerve signs
  - (a) **Trigeminal**  
Homolateral hyperæsthesia
  - (β) Ocular diplopia
  - (γ) Facial paresis
- (5) **Intracranial tension signs**  
Posterior fossa → int. hydrocephalus
- (6) **X Ray** Erosion of internal auditory meatus or petrous bone

**Treat** (1) **Operation**

(a) Suboccipital exploration

- ↓ (b) Intracapsular
- (a) Curetting
  - (β) Suction
  - (γ) Enucleation

↓ (2) Post-operative irradiation

(2) **Fibro-sarcoma**

(d) **Vessels**

(1) **Cerebral telangiectasis** Surface

**Path** Capillary hæmangioma on cortical surface

**Treat** (a) Exploration

+ (b) Canterisation

↓ (c) Irradiation

(2) **Cerebellar angioblastoma** Deep

**Compl** (a) Hæmorrhage

(b) Cyst formation

**Treat** Radical excision

(e) **Brain**

(1) **Glioma**

**Eto** 40% of all intracranial tumours

**Path** Composed of supporting tissue of the brain

**Varieties** (a) **Astrocytoma** Simple glioma

**Age** Any

**Site** Frontal lobe, cerebellum pons

**Path** Slow avascular cystic

**Compl** Cyst formation

**Treat** Excision

↓ Irradiation

(β) **Spongioblastoma** Gliosarcoma

**Age** 40-50 years

Site	Frontal Temporal Sylvian	}	Cerebral
Path	Vascular		
	Local malignancy Cystic degeneration		
Clinic	Rapid and progressive rise in general intracranial tension with series of sudden cerebral attacks		
Sign	Smoothered brain surface Exploration		
Treat	Exploration ↓ Decompression ↓ Irradiation		
	<b>(7) Medulloblastoma</b>		
Age	Childhood		
Site	Cerebellum		
Path	Round celled sarcoma invading the meninges		
Clinic	(1) Early morning headache (2) Vomiting (3) Int. hydrocephalus		
Treat	Exploration ↓ Decompression ↓ Irradiation		
Comp	(1) Cyst formation (2) Haemorrhage (3) Calcification		
	<b>(2) Secondary malignant deposits :</b>		
Etio	(a) 20% of all brain tumours (b) 3-5% of all malignant tumours metastasize in brain. (c) Primaries (a) Bronchial carcinoma 30% (b) Melanotic sarcoma 50% (7) Breast carcinoma		
	<b>(d) Age 40-60 years.</b>		
Clinic	(1) Pseudo-meningo-encephalitis signs (2) Intracranial tension signs (a) Headache severe paroxysm ↓ (b) Cerebral irritation ↓ (c) Coma (3) Nature of the case (a) Elderly patient (b) Short history (c) Sudden onset (4) Presence or history of primary focus		
Treat	Palliative decompression		

(f) *Ependymal growths*

- Path (1) Spongioblastoma  
 (2) Blopharoplastoma

Site Fourth ventricle

Clinic Obstructive hydrocephalus

(g) *Appendages of the brain*

- (1) **Pituitary growths** (See under Pituitary)

Class (A) **Intra sellar tumours**

- (1) **Adenoma**

(a) **Chromophobe**

Etio Commonest

Age 20-40

Clinic Hypopituitarism

(b) **Chromophil**

Age After 30

Path (a) Basophil

(β) Eosinophil

Clinic Hyperpituitarism

(c) **Mixed or transitional**

Age 20-40

Clinic Hypo + hyperpituitarism

- (2) **Adeno-carcinoma**

Age After 45

Path Chromophobe

Liver metastases

Clinic (a) Primary signs

(b) Liver enlarged

- (3) **Cranio-pharyngioma**

(B) **Supra-sellar tumours**

- (1) **Cranio-pharyngioma**

Syn Adamantinoma

Age 10-20 years

Path Slow cysts

Clinic (a) Pressure signs

(a) Local

(β) General

↓ (b) Hypo-pituitarism

- (2) **Endothelioma**

(3) **Basal meningioma**

(4) **Aneurysm**

- (2) **Pineal growths**

Class (1) Glioma

(2) Teratoma

Path (a) Tendency to calcification

(b) Association with internal hydrocephalus



- Clinic (a) Local pressure signs  
 (b) Internal hydrocephalus  
 (c) X Ray calcification
- Treat Excision → Irradiation
- Tech (a) Tapping of hydrocephalus  
 ↓ (b) Exploration  
 (a) Dandy  
 Right occipito-parietal osteoplastic flap  
 (b) Wagenen Trans-ventricular approach  
 ↓ (c) Excision of the tumour

*Pathology of intracranial tumours*

- (1) Direct destruction of local site  
 Focal paralysis
- (2) Pressure effects on surroundings  
 Focal → regional irritation → paralysis
- (3) Interference with cerebrospinal circulation  
 Internal hydrocephalus
- (4) Regional → general rise in intracranial tension
- (5) Special signs Pituitary dysfunction
- (6) Invasion Meninges, skull

*Clinical features of intracranial tumours*

- (1) Focal syndrome
  - (A) Silent area Temperamental and psychic changes  
 Dementia  
 Apathy  
 Perversions  
 Faulty judgement  
 Lack of concentration  
 Lack of memory
  - (B) Rolandic area  
 Twitchings → spasms → convulsions  
 ↓ Paresis → paralysis
  - (C) Broca Motor aphasia
  - (D) Temporal area Auditory taste, smell
  - (E) Occipital area Hemianopia
  - (F) Cerebellum Vertigo  
 Nystagmus  
 Incoordination of movements  
 Ataxia  
 Hypotonia
  - (G) Optic chiasma Early visual disorders
  - (H) Pons Hyperthermia  
 Motor paralysis  
 Pin-point pupils

(2) **Pressure syndrome :**(A) **Regional Irritation** → paresis → paralysis  
Of surrounding centres, nerves or tracts(B) **General**

(1) Recurrent or persistent headache

(2) Recurrent vomiting without nausea

(3) **Visual disorders**

(a) Diminished visual field

(b) Diplopia

(c) Squint

(d) Papilloedema / choked discs

Etio : Anterior chamber tension

Path : Compression of vein of Galen

↓ Hyperæmic choroid plexus

↓ Overproduction of C. S. F

↓ Increased tension

↓ Compression of central vein of retina

↓ Papilloedema

= Venous congestion of disc

↓ (e) Optic atrophy

(4) Bradycardia

(5) Slow cerebration

(3) **Special signs Metabolic disorders****Pituitary dysfunction**(A) **Hyperpituitarism**

(a) Juvenile Gigantism

(b) Adult Acromegaly

(B) **Hypopituitarism**

(a) Juvenile

(1) **Frölich :**

(a) Obesity

(b) Normal growth

(c) Sex infantilism

(d) Low basal metabolism

(e) Increased sugar tolerance

(2) **Simmond**

(a) Cachexia

(b) As in (1)

(b) **Adult****Lorain :**

(a) Dwarfism

(b) Sex infantilism

(c) Hypotrichosis

(C) **Cushing's pituitary basophilism :**

(a) Trunk adiposity

(b) Kyphosis

- (c) Amenorrhoea—Impotence
- (d) Hypertrichosis
- (e) Vascular hypertension
- (f) Erythraemia
- (g) Debility

*Investigations in intracranial tumour syndromes*

- (1) Site: (Local)
  - (A) Palpation of the head
    - (a) Cracked pot note
    - (b) Local tenderness
    - (c) Local swelling
  - (B) Neurological examination
- (2) Nature
  - (A) Age
    - (a) Children T B.
    - (b) Adolescents meningitis
    - (c) Adults gumma
    - (d) Seniles secondaries
  - (B) History
    - (a) Slow meningioma
    - (b) Rapid malignancy
    - (c) Intermittent granulomas
- (3) Examination of other systems
  - (1) Circulatory blood pressure
  - (2) Urinary diabetes
  - (3) Specific syphilis, tubercle
  - (4) Malignancy
  - (5) Septic focus
- (4) Special tests
  - (A) Fundus and visual field examination
  - (B) X Ray
    - (a) Direct evidence calcification
    - (b) Indirect evidence
      - (a) Separation of sutures
      - (b) Bony changes
        - (1) Erosion
        - (2) New formation
        - (3) Rearrangement of vessels
      - (r) Distorted pituitary fossa
      - (s) Pincal shift
  - (C) Cerebrospinal fluid
    - Routes
      - (1) Cistern puncture  
Through atlanto-occipital membrane
      - (2) Spinal puncture
    - Exam
      - (a) Pressure (Queckenstedt's test)
      - (b) Physical chemical bacteriological
      - (c) W R.

**(D) Ventricular Investigations****(1) Puncture**

Route (a) 7 cms. above external occipital process  
+ 1.5 cms. lateral to midline, needle  
towards centre of corresponding eye

(b) 3 cms. above & behind ext. aud. meatus

Note (a) Resistance to the needle  
(b) Depth from the surface  
(c) Amount and character of fluid  
(d) Difference in the volume of fluid from  
the two ventricles : more than 10 c.cs.  
is pathological

**(2) Ventriculography**

(a) Ventricular puncture

↓ (b) Aspiration of ventricular fluid

↓ (c) Replacement by air

↓ (d) Radiography

Tech (1) Bilateral trephines

(a) 1 on either side of midline

(b) 2" above the lambdoidal suture

(2) Dural incision

(3) Introduction of needle

Downwards + forwards + inwards

(Towards the centre of the corresponding eye).

(4) Aspiration of fluid

(5) Introduction of air 50-120 c.cs.

(6) Closure

(7) X-Rays

(a) Lateral

(b) Antero-posterior

(c) Postero-anterior

(d) Special head-down position for IV ventricle

Shows (a) Internal hydrocephalus

(b) Site of obstruction

**(3) Ventricular estimation**

(a) Ventricular puncture

↓ (b) Aspiration of ventricular fluid

↓ (c) Injection of dye

**(E) Encephalography**

Less risky than (D) above and less certain also

Def Air replacement of C. S. fluid via lumbar puncture

Tech (a) Lumbar puncture

(b) Slow withdrawal of fluid

(c) Slow introduction of air 20-25 c.cs.

(d) X Ray after one hour

(a) Antero-posterior

(b) Lateral

- Contraind Increased intra-cranial pressure  
 Sequelæ Headache + vomiting  
 (Keep in head-low position and give sedatives)
- (F) Lipiodol ascendant  
 (G) Thorotrast Into internal carotid artery  
 (H) Exploratory craniotomy  
 Ind Every case of progressive papilloedema

*Treatment of intra-cranial tumours*

(1) Radical removal

- Ind (a) Meningiomata  
 (b) Pituitary tumours  
 (c) Suprasellar cranio-pharyngiomata  
 (d) Acoustic neurinomata  
 (e) Innocent gliomata

Tech (1) Osteoplastic resection of the skull:

- (A) Transfrontal supratentorial basal  
 (B) Lateral parieto-temporal cerebral hemisphere  
 (C) Suboccipital infratentorial  
 (D) Trans-sphenoidal pituitary  
 (E) Right occipito-parietal pineal  
 (F) Subtemporal palliative decompression

(2) Incision of the dura

- Ind Signs of subdural compression

Contraind Extradural sepsis

- (3) Exploration for the tumour  
 (4) Removal of the tumour

(A) Meningioma

(a) Parasagittal

- (a) Cautery removal

- (β) Shelling out

- (γ) Removal with falx and sinus

(b) Basal

Site Route

- (a) Prefrontal transfrontal

- (β) Temporal subtemporal

- (γ) Posterior suboccipital

(B) Glioma

- (a) Astrocytoma radical removal

- (b) Spongioblastoma } ↓ Decompression

- (c) Medullo-blastoma } ↓ Irradiation

(C) Acoustic neuroma

- (a) Intracapsular suction

- (b) Intracapsular curettage

(D) Pituitary

- (a) Suprasellar removal or suction

- (b) Infraselar basal decompression

- (E) Pineal : removal  
           ↓ irradiation
- (F) Angiomata  
       (a) Small diathermy  
       (b) Large : irradiation

(5) Closure

- (a) Complete removal osteoplastic  
 (b) Incomplete removal boneless flap

Difficulties (1) Cessation of respiration

Etiol Subtentorial growths

Treat Artificial respiration  
           + Rapid relief of tension

(2) Injury to venous sinuses

Etiol Parasagittal meningioma

(3) Dural laceration

(4) Brain laceration

(5) Escape of cerebrospinal fluid

(6) Bleeding from

(a) Scalp

(b) Bone

(c) Venous sinuses

(7) Difficulty of access

(II) Palliative decompression

- Ind (1) Inoperable tumours with  
       (a) Severe and persistent headache  
       (b) Failing eyesight  
       (c) Frequent and severe fits  
       (d) Pronounced cerebral vomiting  
       (e) Insomnia or delirium

(2) Preliminary to radical removal

(3) Preliminary to deep X Ray therapy

(4) Preliminary to antisyphilitic treatment

Methods (A) Trephining

- Site (1) Directly over the tumour  
       (2) On the side of the tumour  
       (3) Bilateral temporal  
       (4) Suboccipital

Size Larger than the tumour

(B) Ventricular drainage Of Learmouth

- Ind (a) Pre-operative decompression  
       (b) Post-operative decompression  
       (c) Hernia cerebri

Tech (a) Burr hole

(b) Tapping by posterior route

(c) Insertion of rubber cannula on a stilet

Compl Infection

Prognosis	Fatality	(1)	Tuberculomata	29%
		(2)	Metastatic tumours	21%
		(3)	Gliomata	19.5%
		(4)	Acoustic tumours	12.5%
		(5)	Meningiomata	11.5%
		(6)	Pituitary adenomata	6%

## (V) HERNIA CEREBRI:

Def	Hernial protrusion of the brain tissue through a deficiency in the skull		
Etio	(1)	Septic compound fracture of the skull	
	(2)	Post-operative	
		(a)	Intracranial tension rise
		(b)	Intracranial sepsis
		(c)	Intracranial progressive tumour
Path	Varieties	(1)	Closed scalp intact
		(2)	Open
	(1) Acute	Due to acutely rising intracranial tension	
		(a)	Cedema
		(b)	Sepsis
		(c)	Rapid tumour
	(2) Chronic	Due to slow rise in intracranial tension	
		(a)	Innocent tumour
		(b)	Chronic sepsis
Clinic	(1) Closed	Soft, irregular pulsating mass protrud- ing from a trephine opening and covered by the scalp.	
	or (2) Open	Soft, irregular pulsating mass protrud- ing through a defect in the skull and the scalp and lined by granulations.	
	+ (3)	Signs of interference with the brain function	
		(a)	Local
		(b)	General rise in intracranial tension
Compl	(1)	Strangulation and softening	
	(2)	Trauma	
	(3)	Intracranial sepsis, meningitis, abscess	
Treat	(1)	Removal of the etiology	
		(a)	Cedema
		(b)	Sepsis
		(c)	Tumour
	(A) Acute hernia		
		(1)	Repeated lumbar punctures
		(2)	Dehydration therapy (See above)
		(a)	Rectal mag sulph.
		(b)	Intravenous sucrose
	(3)	Enlargement of trephine opening :	
		If strangulation	

## (B) Chronic hernia

## (1) Prophylactic

Avoidance of simple, palliative decompression where total or partial excision is possible

## (2) Therapeutic

(a) Protection

(b) Excision

(c) Radiotherapy in malignant tumours

## (VI) EPILEPSY

## (1) Idiopathic

(A) Generalised leave it alone

(B) Local → generalised

Treat Medical

(a) Luminal

(b) Sodium diphenyl hydantoinate

Dose 1 gm. T D S. after meals

Comp Toxic symptoms

Contraind

(a) Debility

(b) Arteriosclerosis

(c) Cardio-renal disease

## (2) Secondary

(A) Jacksonian }

(B) Generalised }

Eti (a) Trauma depressed fracture

cerebral adhesions

(b) Pressure intracranial tumour

(c) Hernia cerebri

Treat (1) Excision of the depressed fracture

(2) Excision of the tumour

(3) Treatment of hernia cerebri

(4) Excision of the scar tissue

(5) Interposition at the aperture

(a) Autogenous bone graft

(b) Cartilaginous graft

(c) Perforated silver plate

(d) Celluloid plate

(6) Decompression

Ind Irremovable rise in intracranial pressure

Causes of failure After operative interference

(1) Unsuitable cases Idiopathic

(2) Epilepsy habit

(3) Septic complications

(4) Reformation of adhesions

## (VII) CEREBRAL PARALYSIS:

Types (1) Infantile hemiplegia

(2) Spastic diplegia



	(3) Spastic paraplegia		
	(4) Monoplegia		
Etio	(1) Congenital defects		
	(2) Prenatal syphilis		
	(3) Asphyxia neonatorum		
	(4) Birth trauma Haematoma		
	(5) Intracranial infections		
Path	(1) Spasm stage		
↓	(2) Accommodative contractures		
↓	(3) Fixed deformities		
Clinic	(1) History of delay in standing and walking		
	(2) Mental deficiency and irritability		
	(3) Paralysis of upper motor neurone type		
	(a) Spasms		
	(b) Exaggerated reflexes		
	(c) Absence of trophic changes		
	(4) Deformities		
	(A) Upper extremity		
	<i>Part</i>	<i>Position</i>	
	Shoulder	Slight abduction	
	Elbow	Flexion	
	Forearm	Pronation	
	Wrist	Flexion	
	Thumb	Adduction	
	(B) Lower extremity		
	Hip	Flexion	
	Thigh	Adduction	
	Knee	Flexion	
	Foot	Equino-varus	
Treat	(1) Prophylactic		
	(a) Manipulations		
	(b) Splints		
	(c) Physiotherapy (but no electrotherapy)		
	(d) Muscle education		
	(2) Operative		
	(A) Tendon operations		
	(1) Lower extremities		
	: Tenotomies :		
	<i>Tendons.</i>	<i>Indications.</i>	
	(1) Tendo Achilles	Talipes equinus	
	(2) Steindler	Pes cavus	
	(3) Hamstrings	Knee flexion	
	(4) Adductors	Hip adduction	
Aftertreat	(a) Rest in bed		
	With extremities in abduction		
	splint for 3-8 weeks		
	(β) Physiotherapy and exercises		

## (2) Upper extremities

## (a) Tendon transplantations

Ind Drop wrist

Tech Donor Recipient

Flexors carpi Finger extensors

After treat Cock-up splint + physiotherapy

## (b) Partial resection pronator radii

## (B) Nerve operations

## Stoffel neurectomy

(1) Section of motor tracts in a nerve

(2) Excision of motor branch to a muscle

Nerve.

Indication

- |                     |                   |
|---------------------|-------------------|
| (1) Obturator       | Thigh adduction   |
| (2) Gluteal         | Thigh inversion   |
| (3) Hamstrings      | Knee flexion      |
| (4) Calf muscles    | Talipes equinus   |
| (5) Pronator radii  | Forearm pronation |
| (6) Flexor sublimis | Finger flexion    |
| (7) Flexor pollicis | Thumb flexion     |

## (VIII) CRANIOTOMY OR TREPHINING:

Def Making an opening in the skull with or without the removal of the bone disc and with or without the opening of the dura

## (A) Therapeutic

To treat any intra-cranial lesion

## (B) Palliative

To allow expansion of the brain so as to relieve intra-cranial tension

## Ind (1) TREATMENT OF CRANIAL AND INTRACRANIAL CONDITIONS

## (A) Congenital

- (a) Hydrocephalus
- (b) Meningocele
- (c) Intra-cranial dermoid

## (B) Trauma

## (a) Primary Fracture skull

- (α) Compound fracture skull
- (β) Depressed fracture skull
- (γ) Bullet fractures

## (b) Intermediate

Compression and sepsis

- (a) Compression
  - Intra-cranial hæmorrhage
- (β) Sepsis
  - Intra-cranial or cranial traumatic

## (c) Late Sequelae

- (a) Unresolved contusion
- (β) Traumatic epilepsy

## (C) Infection

- (a) Acute and chronic cranial osteomyelitis
- (b) Intra-cranial abscess
  - (a) Extra-dural
  - (β) Subdural
  - (γ) Cerebral
- (c) Sinus thrombosis

## (D) Intra-cranial and cranial new growth

- (a) Radical removal
- (b) Preliminary to irradiation

## (2) PALLIATIVE DECOMPRESSION

Ind Raised intracranial tension leads to cerebral compression where no treatment is not possible or required

- (1) Breaking of vicious circle
- (2) Inaccessibility
- (3) Inoperability
- (4) Failure of diagnosis of site

- Etiology
- (a) Congenital conditions
  - (b) Traumatic cerebral oedema  
unresolved contusion
  - (c) Intracranial sepsis  
Intractable and prolonged
  - (d) Intracranial new growths  
Irremovable

Sites	Sites	Indications
(1) Transfrontal	Anterior cerebral basal lesions	
(2) Temporal	(A) Lateral cerebral lesions (B) Anterior chamber tension (C) Trigeminal ganglionectomy	
(3) Occipital	(A) Cerebellar lesions (B) Cerebello-pontine tumours (C) Posterior chamber tension (D) Trigeminal ganglionectomy	
(4) Trans-sphenoidal	Pituitary decompression	
(5) Local	Anywhere over the seat of the lesion	

## Pre-operative treatment

- (1) Dehydration treatment
- Ind High intracranial tension

- Tech
- (a) Intravenous glucose or sucrose
  - (b) Rectal mag sulph.



## (c) Late Sequelae

- (a) Unresolved contusion
- (b) Traumatic epilepsy

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- (a) Acute and chronic cranial osteomyelitis
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- (c) Sinus thrombosis

## (D) Intra-cranial and cranial new growths

- (a) Radical removal
- (b) Preliminary to irradiation

## (2) PALLIATIVE DECOMPRESSION

Ind Raised Intracranial tension leading to cerebral compression where radical treatment is not possible or required

- (1) Breaking of vicious circle
- (2) Inaccessibility
- (3) Inoperability
- (4) Failure of diagnosis of site

- Etio
- (a) Congenital conditions
  - (b) Traumatic cerebral oedema  
unresolved contusion
  - (c) Intracranial sepsis  
Intractable and prolonged
  - (d) Intracranial new growths  
Irremovable

## Sites :

## Sites

## Indications

- (1) **Transfrontal** Anterior cerebral basal lesions
- (2) **Temporal** : (A) Lateral cerebral lesions  
(B) Anterior chamber tension  
(C) Trigeminal ganglionectomy
- (3) **Occipital** (A) Cerebellar lesions  
(B) Cerebello-pontine tumour  
(C) Posterior chamber tension  
(D) Trigeminal ganglionectomy
- (4) **Trans-sphenoidal** : Pituitary decompression
- (5) **Local** Anywhere over the seat of the lesion

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Ind High Intracranial tension

- Tech
- (a) Intravenous glucose or sucrose
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- (2) Oxygen and  $\text{CO}_2$  apparatus
- (3) Blood pressure estimation during the operation

Position    Semi-sitting  
 Anaesthesia    Light ether with local or regional novocain  
 Technique

- (1) Flaps
  - (A) Frontal    Ear to ear across the bregma in coronal plane
  - (B) Temporal
    - (a) Semicircular 5 more than bone flap
    - or (b) Vertical incision 3-4 midway between external angular process and pinna, upto 5 above the mid point of zygoma
    - or (c) Vertical incision  
From the top of the ear to mid line  
(In palliative decompression)
  - (C) Occipital
    - (a) Cross-bow
    - or (b) Mid line vertical : lambda to 7c.
  - (D) Semivertex and whole vertex
- (2) Muscle treatment
  - (a) Reflection
  - (b) Split in
    - (a) Decompression
    - (b) Lesions requiring small exposures
- (3) Reflection of periosteum
- (4) Trephining

- Methods (A) Hand trephine
- (a) Remove the pin after settling
  - (b) Test the depth now and then
  - (B) Brace and burr
  - (C) Jäntner trephine
  - (D) Souttar's craniotome
  - (E) De Martel's electric trephine
- (5) Separation of dura from the bone
  - (6) Enlargement of trephine opening
    - (A) Craniectomy  
Removal of the bone disc with enlargement of the aperture by nibbling forceps
    - (B) Craniotomy  
Osteoplastic resection of the skull with retention of bevelled bone in the flap

## (c) Late Sequelae

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Irremovable

**Sites****Sites****Indications**

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- (3) **Occipital** : (A) Cerebellar lesions  
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(a) Semicircular 5 more than bone flap

or (b) Vertical incision 3-4 midway between external angular process and pinna, upto 5 above the mid point of zygoma

or (c) Vertical incision

From the top of the ear to mid line  
 (In palliative decompression)

(C) Occipital

(a) Cross-bow

or (b) Mid line vertical lambda to 7c.

(D) Semivortex and whole vertex

(2) Muscle treatment

(a) Reflection

(b) Split in

(a) Decompression

(b) Lesions requiring small exposures

(3) Reflection of periosteum

(4) Trephining

Methods (A) Hand trephine

(a) Remove the pin after settling

(b) Test the depth now and then

(B) Brace and burr

(C) Jentner trephine

(D) Souttar's craniotome

(E) De Martel's electric trephine

(5) Separation of dura from the bone

(6) Enlargement of trephine opening

(A) Craniectomy

Removal of the bone disc with enlargement of the aperture by nibbling forceps

(B) Craniotomy

Osteoplastic resection of the skull with retention of bevelled bone in the flap



(c) **Late Sequelae**

- (a) Unresolved contusion
- (b) Traumatic epilepsy

(C) **Infection**

- (a) Acute and chronic cranial osteomyelitis
- (b) Intra-cranial abscess
  - (a) Extra-dural
  - (b) Subdural
  - (c) Cerebral
- (c) Sinus thrombosis

(D) **Intra-cranial and cranial new growths**

- (a) Radical removal
- (b) Preliminary to irradiation

(2) **PALLIATIVE DECOMPRESSION**

**Ind** Raised intracranial tension leading to cerebral compression where radical treatment is not possible or required

- (1) Breaking of vicious circle
- (2) Inaccessibility
- (3) Inoperability
- (4) Failure of diagnosis of site

- Eti**
- (a) Congenital conditions
  - (b) Traumatic cerebral oedema  
unresolved contusion
  - (c) Intracranial sepsis  
Intractable and prolonged
  - (d) Intracranial new growths  
Irremovable

Sites	Sites	Indications
(1)	Transfrontal	Anterior cerebral basal lesions
(2)	Temporal	(A) Lateral cerebral lesions (B) Anterior chamber tension (C) Trigeminal ganglionectomy
(3)	Occipital	(A) Cerebellar lesions (B) Cerebello-pontine tumour (C) Posterior chamber tension (D) Trigeminal ganglionectomy
(4)	Trans-sphenoidal	Pituitary decompression
(5)	Local	Anywhere over the seat of the lesion

**Pre-operative treatment**

- (1) Dehydration treatment
  - Ind** High intracranial tension
  - Tech** (a) Intravenous glucose or sucrose
  - (b) Rectal mag sulph.

- (2) Oxygen and  $\text{CO}_2$  apparatus
- (3) Blood pressure estimation during the operation

Position      Semi-sitting  
 Anaesthesia    Light ether with local or regional novocain  
 Technique

(1) Flaps

(A) Frontal    Ear to ear across the brow in coronal plane

(B) Temporal

(a) Semicircular 5 more than bone flap

or (b) Vertical incision 3-4, midway between external angular process and pinna, upto 5 above the mid point of zygoma

or (c) Vertical incision  
 From the top of the ear to mid line  
 (In palliative decompression)

(C) Occipital

(a) Cross-bow

or (b) Mid line vertical lambda to 7c.

(D) Semivertex and whole vertex

(2) Muscle treatment

(a) Reflection

(b) Split in

(a) Decompression

(b) Lesions requiring small exposures

(3) Reflection of periosteum

(4) Trephining:

Methods (A) Hand trephine

(a) Remove the pin after settling

(b) Test the depth now and then

(B) Brace and burr

(C) Jaentzner trephine

(D) Souttar's craniotome

(E) De Martel's electric trephine

(5) Separation of dura from the bone

(6) Enlargement of trephine opening

(A) Craniectomy

Removal of the bone disc with enlargement of the aperture by nibbling forceps

(B) Craniotomy

Osteoplastic resection of the skull with retention of bevelled bone in the flap

(c) **Late Sequelae**

- (a) Unresolved contusion
- (β) Traumatic epilepsy

(C) **Infection**

- (a) Acute and chronic cranial osteomyelitis
- (b) Intra-cranial abscess
  - (a) Extra-dural
  - (β) Subdural
  - (γ) Cerebral
- (c) Sinus thrombosis

(D) **Intra-cranial and cranial new growths**

- (a) Radical removal
- (b) Preliminary to irradiation

(2) **PALLIATIVE DECOMPRESSION**

**Ind** Raised intracranial tension leading to cerebral compression where radical treatment is not possible or required

- (1) Breaking of vicious circle
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  - (b) Traumatic cerebral oedema  
unresolved contusion
  - (c) Intracranial sepsis  
Intractable and prolonged
  - (d) Intracranial new growths  
Irremovable

**Sites :****Sites****Indications**

- (1) **Transfrontal** Anterior cerebral basal lesions
- (2) **Temporal**
  - (A) Lateral cerebral lesions
  - (B) Anterior chamber tension
  - (C) Trigeminal ganglionectomy
- (3) **Occipital**
  - (A) Cerebellar lesions
  - (B) Cerebello-pontine tumour
  - (C) Posterior chamber tension
  - (D) Trigeminal ganglionectomy
- (4) **Trans-sphenoidal** Pituitary decompression
- (5) **Local :** Anywhere over the seat of the lesion

**Pre-operative treatment**

- (1) Dehydration treatment
  - Ind** High intracranial tension
  - Tech**
    - (a) Intravenous glucose or sucrose
    - (b) Rectal mag sulph.

- (2) Oxygen and  $\text{CO}_2$  apparatus
- (3) Blood pressure estimation during the operation

Position      Semi-sitting  
 Anaesthesia    Light ether with local or regional novocain  
 Technique

(1) Flaps

(A) Frontal : Ear to ear across the bregma in coronal plane

(B) Temporal

(a) Semicircular 5 more than bone flap

or (b) Vertical incision 3-4 midway between external angular process and pinna, upto 5 above the mid point of zygoma

or (c) Vertical incision  
 From the top of the ear to mid line  
 (In palliative decompression)

(C) Occipital

(a) Cross-bow

or (b) Mid line vertical lambda to 7c.

(D) Semivertex and whole vertex

(2) Muscle treatment

(a) Reflection

(b) Split in

(a) Decompression

(b) Lesions requiring small exposures

(3) Reflection of periosteum

(4) Trephining

Methods : (A) Hand trephine

(a) Remove the pin after settling

(b) Test the depth now and then

(B) Brace and burr

(C) Jantner trephine

(D) Souttar's craniotome

(E) De Martel's electric trephine

(5) Separation of dura from the bone

(6) Enlargement of trephine opening

(A) Craniectomy

Removal of the bone disc with enlargement of the aperture by nibbling forceps

(B) Craniotomy

Osteoplastic resection of the skull with retention of bevelled bone in the flap

(c) **Lato: Sequolae**

- (a) Unresolved contusion  
(β) Traumatic epilepsy

**(C) Infection**

- (a) Acute and chronic cranial osteomyelitis
- (b) Intra-cranial abscess
  - (a) Extra-dural
  - (β) Subdural
  - (γ) Cerebral
- (c) Sinus thrombosis

(D) Intra-cranial and cranial new growths

- (a) Radical removal  
(b) Preliminary to irradiation

## (2) PALLIATIVE DECOMPRESSION

Ind Raised intracranial tension leading to cerebral compression where radical treatment is not possible or required

- (1) Breaking of vicious circle
- (2) Inaccessibility
- (3) Inoperability
- (4) Failure of diagnosis of site

**Etiology**

- (a) Congenital conditions
- (b) Traumatic cerebral oedema  
unresolved contusion
- (c) Intracranial sepsis  
Intractable and prolonged
- (d) Intracranial new growths  
Irremovable

Sites	Sites	Indications
(1)	Transfrontal	Anterior cerebral basal lesions
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(4)	Trans-sphenoidal	Pituitary decompression
(5)	Local	Anywhere over the seat of the lesion

### Pre-operative treatment

- |      |                                    |
|------|------------------------------------|
|      | (1) Dehydration treatment          |
| Ind  | High intracranial tension          |
| Tech | (a) Intravenous glucose or sucrose |
|      | (b) Rectal mag. sulph.             |

	(2) Oxygen and $\text{CO}_2$ apparatus
	(3) Blood pressure estimation during the operation
Position	Semi sitting
Anaesthesia	Light ether with local or regional novocain
Technique	

## (1) Flaps

(A) Frontal Ear to ear across the bregma in coronal plane

## (B) Temporal

- (a) Semicircular 5 more than bone flap  
 or (b) Vertical incision 3-4 midway between external angular process and pinna, upto 5 above the mid point of zygoma  
 or (c) Vertical incision  
 From the top of the ear to mid line  
 (In palliative decompression)

## (C) Occipital

- (a) Cross-bow  
 or (b) Mid line vertical : lambda to 7c.

## (D) Semivertex and whole vertex

## (2) Muscle treatment

- (a) Reflection  
 (b) Split in  
     (a) Decompression  
     (b) Lesions requiring small exposures

## (3) Reflection of periosteum

## (4) Trephining

## Methods (A) Hand trephine

- (a) Remove the pin after settling  
 (b) Test the depth now and then

## (B) Brace and burr

## (C) Jäntzner trephine

## (D) Souttar's craniotome

## (E) De Martel's electric trephine

## (5) Separation of dura from the bone

## (6) Enlargement of trephine opening

## (A) Craniectomy

Removal of the bone disc with enlargement of the aperture by nibbling forceps

## (B) Craniotomy

Osteoplastic resection of the skull with retention of bevelled bone in the flap



- (2) Oxygen and  $\text{CO}_2$  apparatus
- (3) Blood pressure estimation during the operation

Position Semi-sitting  
 Anaesthesia Light ether with local or regional novocain  
 Technique

(1) Flaps

(A) Frontal Ear to ear across the bregma in coronal plane

(B) Temporal

- (a) Semicircular 5 more than bone flap
- or (b) Vertical incision 3-4 midway between external angular process and pinna, upto 5 above the mid point of zygoma
- or (c) Vertical incision  
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(C) Occipital

- (a) Cross-bow
- or (b) Mid line vertical lambda to 7c.

(D) Semivertex and whole vertex

(2) Muscle treatment

- (a) Reflection
- (b) Split in
  - (a) Decompression
  - (b) Lesions requiring small exposures

(3) Reflection of periosteum

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- (a) Remove the pin after settling
- (b) Test the depth now and then

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(A) Craniectomy

Removal of the bone disc with enlargement of the aperture by nibbling forceps

(B) Craniotomy

Osteoplastic resection of the skull with retention of bevelled bone in the flap



## (7) Inspection and treatment of dura

- Note (a) Subdural tension  
 (b) Dural pulsations  
 (c) Dural colour

## (8) Opening dura by crucial incision

- Ind (a) Subdural tension  
 (α) Traumatic  
 (β) Septic  
 (γ) New growth  
 (b) Subdural infection  
 (c) Subdural and dural laceration  
 (d) Subdural new growth
- Contraind (a) No signs of subdural tension  
 (b) Extra-dural sepsis  
 (α) Actual  
 (β) Potential

## (9) Treatment of the primary condition

## (10) Closure

## (A) Osteoplastic Craniotomy

- Ind (1) Radical removal of tension cause  
 + (2) No sepsis actual or potential

## (B) Disc-less Craniectomy

- Ind (1) Palliative decompression  
 (2) Sepsis actual or potential  
 (3) Cause of compression  
 (α) Partial removal  
 (β) Chance of recurrence  
 (γ) Need of irradiation

## Difficulties and dangers

## (1) Haemorrhage

## (A) Scalp

- (a) Rubber tourniquet round the skull base  
 (b) Special clamps Ballance  
 Sargent  
 Makkas  
 (c) Injection of novocain with adrenaline  
 (d) Eversion of galea  
 Over cut margin of skin incision  
 (e) Blanket or continuous margin suture

## (B) Bone

- (a) Compression of the bone  
 (b) Horsley's wax carbolic acid : 1 part  
 olive oil 2 parts  
 yellow wax 7 parts  
 (c) Foramen plugging  
 (d) Muscle graft

(C) *Dura*

- (a) Hot irrigations
- (b) Under-running sutures
- (c) Silver clips
- (d) Caustery

(D) *Sinuses*

- (a) Postage stamp
- (b) Muscle graft
- (c) Plugging
- (d) Ligature of both ends

(E) *Brain*

- (a) Muscle graft
- (b) Pack

(F) *Inaccessible depth of skull base*

Ligature of ext. or common carotid art.  
(For uncontrollable hæmorrhage)

(2) **Cessation of respiration**

Etio Posterior chamber operations

- Treat
- (a) Sitting posture
  - (b) Rapid trephining
  - (c) Lumbar puncture
  - (d) Artificial respiration

(3) **Mechanical and anatomical difficulties**(4) **Too great intracranial pressure**

- Treat
- (a) Enlarge the trephine opening
  - (b) Tap the ventricles
  - (c) Cautious spinal puncture
  - (d) Pre and post dehydration therapy

Post-compl (1) **Shock**

- Treat
- (a) Blood transfusion
  - (b) Black coffee per rectum 5 oz.
  - (c) Glucose intravenous

(2) **Internal hæmorrhage**

- Clinic
- (a) Persistent uncontrollable pain
  - (b) Restlessness
  - (c) Slow respiration

Treat Reopen and treat the focus

(3) **Vomiting** After cerebellar operations(4) **Headache**

Treat Repeated lumbar punctures  
Dehydration therapy

(5) **Mania**: After frontal lobe operations(6) **Hyperpyrexia**

Treat Wrap up in wet blanket or cold breeze or air  
blast on extremities

**(7) Inspection and treatment of dura**

- Note** (a) Subdural tension  
 (b) Dural pulsations  
 (c) Dural colour

**(8) Opening dura by crucial incision**

- Ind** (a) Subdural tension  
       (a) Traumatic  
       (β) Septic  
       (γ) New growth  
 (b) Subdural infection  
 (c) Subdural and dural laceration  
 (d) Subdural new growth
- Contraind** (a) No signs of subdural tension  
 (b) Extra dural sepsis  
       (a) Actual  
       (β) Potential

**(9) Treatment of the primary condition****(10) Closure****(A) Osteoplastic Craniotomy**

- Ind** (1) Radical removal of tension cause  
 + (2) No sepsis actual or potential

**(B) Disc-less: Craniectomy**

- Ind** (1) Palliative decompression  
 (2) Sepsis actual or potential  
 (3) Cause of compression  
       (a) Partial removal  
       (β) Chance of recurrence  
       (γ) Need of irradiation

**Difficulties and dangers****(1) Haemorrhage:****(A) Scalp**

- (a) Rubber tourniquet round the skull base  
 (b) Special clamps Ballance  
                                   Sargent  
                                   Malkas  
 (c) Injection of novocain with adrenaline  
 (d) Eversion of galea  
       Over cut margin of skin incision  
 (e) Blanket or continuous margin stitch

**(B) Bone**

- (a) Compression of the bone  
 (b) Horsley's wax carbolic acid 1 part  
                                   olive oil: 2 parts  
                                   yellow wax 7 parts  
 (c) Foramen plugging  
 (d) Muscle graft

(C) *Dura*

- (a) Hot irrigations
- (b) Under running sutures
- (c) Silver clips
- (d) Cautery

(D) *Sinuses*

- (a) Postage stamp
- (b) Muscle graft
- (c) Plugging
- (d) Ligature of both ends

(E) *Brain*

- (a) Muscle graft
- (b) Pack

(F) *Inaccessible depth of skull base*

Ligature of ext. or common carotid art.  
(For uncontrollable hæmorrhage)

(2) **Cessation of respiration**

Etiol Posterior chamber operations

- Treat
- (a) Sitting posture
  - (b) Rapid trephining
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(3) **Mechanical and anatomical difficulties**(4) **Too great intracranial pressure :**

- Treat
- (a) Enlarge the trephine opening
  - (b) Tap the ventricles
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Post-compl (1) **Shock**

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(2) **Internal hæmorrhage**

- Clinic
- (a) Persistent uncontrollable pain
  - (b) Restlessness
  - (c) Slow respiration

Treat Reopen and treat the focus

(3) **Vomiting : After cerebellar operations**(4) **Headache**

Treat Repeated lumbar punctures  
Dehydration therapy

(5) **Mania After frontal lobe operations**(6) **Hyperpyrexia**

Treat Wrap up in wet blanket or cold breeze or air  
blast on extremities

- (7) Lung complications    Edema of the lungs  
                                  Pneumonia
- (8) Intracranial sepsis
- (9) Hernia cerebri

#### Post-operative irradiation

- Ind    Malignant growths
- Tech   (a) Decompression
- ↓ (b) Deep X Ray or radium    after 2 weeks

### (IX) IMPORTANT POINTS

#### (i) TRAUMA

##### (A) Fracture skull

- (1) Even a severe local deformation (depressed) fracture of the skull may be unaccompanied by slightest concussion. Compression may develop as a result of edema of the brain due to local contusion or laceration.
- (2) There are only two contraindications for operation in fracture skull
  - (a) Hopeless condition
  - (b) General deformation fracture with no compression signs.
- (3) Brain complications of fracture skull are
  - (a) Concussion
  - (b) Contusion and laceration
  - (c) Edema
  - (d) Compression due to
    - (α) Depressed fracture
    - (β) Haemorrhage
    - (γ) Edema
    - (δ) Sepsis
  - (e) Sepsis
  - (f) Adhesions
  - (g) Hernia cerebri
  - (h) Neurosis.
- (4) Treatment of fracture skull
  - (1) Local deformation    always operate
  - (2) General deformation  
                                  Expectant unless compression.
- (5) Do not forget to examine all other parts of the body in a case of fracture skull.

##### (B) Concussion

- (6) Traumatic unconsciousness—concussion—is a purely physiological state.
- (7) Main clinical features of concussion are
  - (1) Instantaneous and widespread onset

- (2) Simultaneously widespread paralysis of all brain functions
- (3) Spontaneous and sudden recovery
- (4) Retrograde amnesia.
- (8) Retrograde amnesia is present in and pathognomonic of every case of concussion and is of medico-legal importance. No concussed person ever knows the exact details of his accident.
- (9) *Hæmatemesis* after concussion period
  - ? (a) Swallowed blood from
    - (a) Skull base
    - (b) Pharynx
    - (c) Lungs.
  - ? (b) Injury to the stomach.
- (10) Vomiting augurs the recovery from concussion
- (11) In most cases of head injury the less we do in the stage of concussion the better

### (C) *Hæmorrhage*

- (12) In extra-dural hæmorrhage
  - (a) Lucid interval varies from 7 hours to 21 days
  - (b) Ipsilateral fixed dilated pupil is very common
- (13) Extra-dural hæmorrhage
  - (a) Slow gradual extension of symptoms and signs
    - (a) In stages irritative → paralytic
    - (b) In areas local → regional → unilateral → bilateral → subtentorial
  - (b) Latent silent period
  - (c) Inequality of signs on both sides.
- (14) Two main causes of mortality in middle meningeal hæmorrhage
  - (a) Failure to operate or delay in operating
  - (b) Concomitant laceration of the brain.
- (15) *During first forty-eight hours* increased intracranial tension must be due to intracranial hæmorrhage, either extra-dural or subdural. *Dehydration should not be practised* during this period.
- (16) The primary task of a surgeon faced with head injury will be to exclude as early as possible the possibility of a surgical clot or to operate on it when he suspects it.
- (17) In traumatic intracranial hæmorrhage, whether epidural or subdural one should operate on suspicion rather than wait for textbook pictures.
- (18) Subdural diffuse and intraventricular hæmorrhages are rapidly fatal and are contraindications for operative treatment.

- |                         |                 |
|-------------------------|-----------------|
| (7) Lung complications  | Cedema of the l |
| (8) Intracranial sepsis | Pneumonia       |
| (9) Hernia cerebri      |                 |

### Post-operative irradiation

Ind Malignant growths

Tech (a) Decompression

↓ (b) Deep X Ray or radium after 2

### (IX) IMPORTANT POINTS

## (1) TRAUMA

(A) Fracture skull

- (1) Even a severe local deformation (depressed, of the skull may be unaccompanied by concussion. Compression may develop a of oedema of the brain due to local con laceration.
- (2) There are only two contraindications for op fracture skull
  - (a) Hopeless condition
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  - (a) Concussion
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  - (c) Oedema
  - (d) Compression due to
    - (a) Depressed fracture
    - (b) Haemorrhage
    - (c) Oedema
    - (d) Sepsis
  - (e) Sepsis
  - (f) Adhesions
  - (g) Hernia cerebri
  - (h) Neurosis.
- (4) Treatment of fracture skull
  - (1) Local deformation always operate
  - (2) General deformation Expectant unless compression.
- (5) Do not forget to examine all other parts of in a case of fracture skull.

(B) **Concussion:**

- (6) Traumatic unconsciousness—concussion—physiological state.
- (7) Main clinical features of concussion are
  - (1) Instantaneous and widespread onset

- (2) Simultaneously widespread paralysis of all brain functions
- (3) Spontaneous and sudden recovery
- (4) Retrograde amnesia.
- (8) Retrograde amnesia is present in and pathognomonic of every case of concussion and is of medico-legal importance. No concussed person ever knows the exact details of his accident.
- (9) Haematemesis after concussion period
  - ? (a) Swallowed blood from
    - (a) Skull base
    - (β) Pharynx
    - (γ) Lungs.
  - ? (b) Injury to the stomach.
- (10) Vomiting augurs the recovery from concussion
- (11) In most cases of head injury the less we do in the stage of concussion, the better.

### (C) Haemorrhage

- (12) In extra-dural haemorrhage
  - (a) Lucid interval varies from 7 hours to 21 days
  - (b) Ipsilateral fixed dilated pupil is very common
- (13) Extra-dural haemorrhage
  - (a) Slow gradual extension of symptoms and signs
    - (a) In stages irritative → paralytic
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- (16) The primary task of a surgeon faced with head injury will be to exclude as early as possible the possibility of a surgical clot or to operate on it when he suspects it.
- (17) In traumatic intracranial haemorrhage, whether epidural or subdural one should operate on suspicion rather than wait for textbook pictures.
- (18) Subdural diffuse and intraventricular haemorrhages are rapidly fatal and are contraindications for operative treatment.



(IX) **IMPORTANT POINTS**

(1) TRAUMA

(A) Fracture skull

- fracture skull
- (1) Even a severe local deformation (depressed) fracture of the skull may be unaccompanied by slight concussion. Compression may develop as a result of oedema of the brain due to local contusion and laceration.
  - (2) There are only two contraindications for operation in fracture skull
    - (a) Hopeless condition
    - (b) General deformation fracture with no compression signs.
  - (3) Brain complications of fracture skull are
    - (a) Concussion
    - (b) Contusion and laceration
    - (c) Oedema
    - (d) Compression due to
      - (α) Depressed fracture
      - (β) Haemorrhage
      - (γ) Oedema
      - (δ) Sepsis
    - (e) Sepsis
    - (f) Adhesions
    - (g) Hernia cerebri
    - (h) Neurosis.
  - (4) Treatment of fracture skull
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  - (a) Lucid interval varies from 7 hours to 21 days
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- (13) Extra-dural hæmorrhage
  - (a) Slow gradual extension of symptoms and signs
    - (a) In stages irritative → paralytic
    - (b) In areas local → regional → unilateral → bilateral → subtentorial
  - (b) Latent silent period
  - (c) Inequality of signs on both sides
- (14) Two main causes of mortality in middle meningeal hæmorrhage
  - (a) Failure to operate or delay in operating
  - (b) Concomitant laceration of the brain.
- (15) *During first forty-eight hours increased intracranial tension must be due to intracranial hæmorrhage, either extra-dural or subdural. Dehydration should not be practised during this period.*
- (16) The primary task of a surgeon faced with head injury will be to exclude as early as possible the possibility of a surgical clot or to operate on it when he suspects it.
- (17) In traumatic intracranial hæmorrhage whether epidural or subdural one should operate on suspicion rather than wait for text book pictures.
- (18) Subdural diffuse and intraventricular hæmorrhages are rapidly fatal and are contraindications for operative treatment.

- (7) Lung complications    *Cedema of the lungs*  
                                      *Pneumonia*  
 (8) Intracranial sepsis  
 (9) Hernia cerebri

Post-operative irradiation

- Ind    *Malignant growths*  
 Tech    (a) Decompression  
           ↓ (b) Deep X Ray or radium    after 2 weeks

## (IX) IMPORTANT POINTS

### (I) TRAUMA

#### (A) Fracture skull

- (1) Even a severe local deformation (depressed) fracture of the skull may be unaccompanied by slightest concussion. Compression may develop as a result of cedema of the brain due to local contusion or laceration.
- (2) There are only two contraindications for operation in fracture skull
  - (a) Hopeless condition
  - (b) General deformation fracture with no compression signs.
- (3) Brain complications of fracture skull are
  - (a) Concussion
  - (b) Contusion and laceration
  - (c) Cedema
  - (d) Compression due to
    - (a) Depressed fracture
    - (b) Haemorrhage
    - (c) Cedema
    - (d) Sepsis
  - (e) Sepsis
  - (f) Adhesions
  - (g) Hernia cerebri
  - (h) Neurosis.
- (4) Treatment of fracture skull
  - (1) Local deformation always operate
  - (2) General deformation  
Expectant unless compression.
- (5) Do not forget to examine all other parts of the body in a case of fracture skull.

#### (B) Concussion

- (6) Traumatic unconsciousness—concussion—is a purely physiological state.
- (7) Main clinical features of concussion are
  - (1) Instantaneous and widespread onset

- (2) Simultaneously widespread paralysis of all brain functions
- (3) Spontaneous and sudden recovery
- (4) Retrograde amnesia.
- (8) Retrograde amnesia is present in and pathognomonic of every case of concussion and is of medico-legal importance. No concussed person ever knows the exact details of his accident.
- (9) Haematemesis after concussion period
  - ? (a) Swallowed blood from
    - (a) Skull base
    - (β) Pharynx
    - (γ) Lungs.
  - ? (b) Injury to the stomach.
- (10) Vomiting augurs the recovery from concussion
- (11) In most cases of head injury the less we do in the stage of concussion, the better

### (C) Haemorrhage

- (12) In extra-dural haemorrhage
  - (a) Lucid interval varies from 7 hours to 21 days
  - (b) Ipsilateral fixed dilated pupil is very common
- (13) Extra-dural haemorrhage
  - (a) Slow gradual extension of symptoms and signs
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- (17) In traumatic intracranial haemorrhage, whether epidural or subdural one should operate on suspicion rather than wait for text-book pictures.
- (18) Subdural diffuse and intraventricular haemorrhages are rapidly fatal and are contraindications for operative treatment.

- (19) The intracranial hæmorrhages amenable to treatment are
  - (a) Extra-dural
  - (b) Localised subdural
- (20) Hæmorrhage, once started in the cranial cavity is progressive and calls urgently for immediate operative treatment.
- (21) Chronic subdural hæmatoma is the commonest cause of a local alteration in the contour of a child's skull.
- (22) Subdural hæmatomas follow in about 9-13% of all severe head injuries.
- (23) Subdural hæmorrhage is more frequent than extra-dural.
- (24) In all head injuries, it is most important to diagnose
  - (a) Presence of intracranial hæmorrhage
  - (b) Site of the hæmorrhage.
- (25) Diagnosis of the site of intracranial hæmorrhage
  - (a) Focal signs spasms or paralysis
  - (b) Pupils
  - (c) Local trauma of the overlying structures
  - (d) Lumbar puncture.
- (26) Causes of intracranial hæmorrhage
  - (1) Apoplexy
  - (2) Traumatic
  - (3) Ruptured aneurysm
  - (4) Hæmorrhage into gliomas
  - (5) Angiomatous tumours.
- (27) If a middle meningeal hæmatoma is found to be extending towards occipital region do not go on nibbling posteriorly. Make a second incision and trephine for posterior branch.

**(D) Contusion—laceration—œdema of the brain**

- (28) Patients who remain unconscious for hours or days are suffering from something more than concussion: viz. contusion, laceration or hæmorrhage.
- (29) It is only after the first forty-eight hours that the surgeon has to worry about cerebral œdema, the treatment of which is dehydration which can best be done by intravenous injections of 50-100 c.c. of 50% glucose or 200-300 c.c. of 50% sucrose.
- (30) Cerebral laceration with intra-dural hæmorrhage is more frequent than extra-dural hæmorrhage.
- (31) Symptoms due to cerebral œdema alone are
  - (a) Only irritative—not developing into paralytic
  - (b) Widespread.

**(E) Traumatic compression :**

- (32) Compression of the brain gradually increasing interference with the cerebral circulation and consequent interference with the functions of the brain.
- (33) The classical signs of cerebral compression
  - (a) Dilated non reacting pupils
  - (b) Slow stertorous breathing
  - (c) Bradycardia with hyperpiesia
  - (d) Coma.

These are the signs of impending death and show that the period of grace has gone by
- (34) All cases of early acute cerebral compression should have the scalp shaved.
- (35) *Compression within first forty-eight hours after an head injury must be due to intracranial hæmorrhage and requires exploratory craniotomy*
- (36) Compression after the first forty-eight hours after an head injury must be due to
  - (a) Cerebral oedema    dehydration treatment
  - (b) Extradural hæmorrhage  
Exploratory craniotomy
- (37) Lumbar puncture is highly dangerous in cases of increased intracranial tension and may bring on sudden death due to wedging of the medulla into foramen magnum.  
However in head injuries, where compression is suspected it should be done in head low position as it helps in diagnosing subarachnoid hæmorrhage, noting its progress and also in deciding the line of treatment.
- (38) In subtentorial compression, vital centres are affected early and most, consciousness lasting till the last.

**(F) Cerebral sequelæ**

- (39) Rest must be enforced on every patient who has had head injury to cause moderate cerebral concussion the period depending on the nature of work and relapse of symptoms
- (40) Violent exercises and straining should be forbidden for some period (3 months) after a severe head injury to guard against Spät-apoplexie.

**(G) Clinical aspects of Intracranial trauma**

- (41) The factors in the variability of symptoms and signs of head injury are
  - (a) Severity  
Transient → mild → moderate → severe.



- (46) Chief differential diagnosis between
- (1) Early compression or cerebral irritation  
Unreasonable automaton  
With purposive action.
  - and (2) Alcoholic bout  
Yields to arguments or deviation of attention.
- (47) Every case of head injury with compression may have to be differentially diagnosed from alcoholism for which prolonged medical observation is necessary. Always admit such a patient to a surgical hospital.

#### (H) Treatment of head injury

- (48) *Avoid morphia. Best sedative is a good dose of mag sulph.*
- (49) It is wrong to give an intravenous dehydrating agent to every case of acute brain injury immediately on admission to the hospital. It should be used only when the oedema of the brain causing rise in intracranial pressure, is present as shown by clinical signs and spinal manometer after forty eight hours from the time of injury.
- (50) Intravenous dextrose causes a reactionary rise in the cerebrospinal fluid pressure, after a fall in it but has a nutrient value.
- (51) Intravenous sucrose does not appear in cerebrospinal fluid and so does not cause a secondary rise in the intracranial pressure but has no nutritional value.
- (52) Rebound or return of the cerebral compression in an exaggerated form is far less likely to occur with sucrose than with dextrose, but the former causes general dehydration together with cerebral dehydration.
- (53) Indications for operative interference in brain injuries
- (1) Compression within the first 48 hours
  - (2) Recurrence of brain symptoms after recovery from concussion
  - (3) Prolonged cerebral irritation
  - (4) Progressive compression
    - (a) Consciousness  $\rightarrow$  Coma
    - (b) Irritation  $\rightarrow$  Paralysis
    - (c) Focal  $\rightarrow$  Regional  $\rightarrow$  Chamber  $\rightarrow$  General
  - (5) Inequality of signs on both sides
  - (6) Blood pressure and pulse good.



- (54) There are two conditions which are definitely improved by operation  
 (a) Depressed local fracture  
 (b) Extra-dural hæmorrhage.
- (55) Trephine over the suspected lesion  
 If nothing found  
 (a) Enlarge the opening  
 ↓ (b) Fresh opening on other likely places  
 ↓ (c) Trephine over the contre-coup site.
- (56) Before trephining for head injury decide the following  
 (A) Is trephining indicated?  
 Ind (1) Slow or medium compression  
 (2) Depressed or compound fracture  
 (B) *The side on which to trephine:*  
 (1) Same side (a) Local  
 (b) Blind decompression  
 (2) Other side (a) Contre-coup site  
 (b) Blind decompression  
 Ind (1) *Side of advanced pupillary changes*  
 (2) *Opposite to advanced muscular changes*  
 (C) *The exact place to trephine*
- (57) Best time to trephine for intracranial injuries is "reaction or early compression" period.
- (58) *Greatest contraindication to trephining is Commencing failure of vital centres, as denoted by fall in blood pressure.*

## (II) INTRACRANIAL SEPSIS

### (A) Sinus thrombosis

- (59) Spreading oedema and malaria like temperature in a case of local sepsis on the head or face  
 ? Sinus thrombosis
- (60) Preventive treatment of sinus thrombosis  
 Ligate the vein communicating the primary focus with the sinus, before treating the former
- (61) If thrombosis is established, tie the efferent vein before interfering with the affected sinus.
- (62) Most common complication of sinus thrombosis is septic embolism, denoted by rigors with high temperature.
- (63) Most common etiologies in sinus thrombosis  
 (1) Lateral sinus mastoiditis  
 (2) Cavernous sinus carbuncle upper lip  
 (3) Superior longitudinal sinus nasal sepsis.

**(B) Abscess of the brain**

- (64) Commonest cause of all abscesses in the cranial cavity is chronic otorrhoea.
- (65) Any intracranial disturbance with a septic focus either near the skull or far away  
? Intracerebral abscess.
- (66) Three stages of the development of brain abscess  
 (1) Initial stage of local meningo-encephalitis  
 (2) Quiescent stage of liquefaction & encapsulation  
 Syn Stage of operation  
 Path (a) Thin walled aspirate  
 (b) Thick walled drain  
 Clinic (1) Subsidence or temperature  
 (2) Local neurological signs  
 (3) Leucocytosis  $> 12000$ .
- (3) Terminal stage of  
 (a) Recovery  
 or (b) Death
- (67) Slow pulse rate is more suggestive of an abscess than a tumour of the brain.
- (68) Severe localised headache is a prominent feature of brain abscess and its presence in the course of extracranial or cranial septic focus should be viewed with suspicion.
- (69) Even with the most skilful diagnosis and treatment the acute fulminating intracranial suppurations cause death and when possible, operation on the brain abscess ought to be deferred until it has become encapsulated.
- (70) In brain abscess, rub the exposed surface and cut edge of the cranium and its coverings with BIPP after trephining and before evacuation of the pus.
- (71) In intracranial abscess secondary to otitis, open the mastoid and the middle ear and then follow the route of infection as seen by morbid changes.
- (72) An encapsulated abscess rises towards the surface if a decompression is made directly over it.
- (73) In brain abscess, it is better to wait till a capsule has formed around it, provided the patient's condition will allow temporisation.

**(C) Miscellaneous**

- (74) Condition of the patient in  
 (A) Septic meningitis anxious and irritable  
 (B) Sinus thrombosis bright and animated  
 (C) Brain abscess dull or stuporous

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## (75) Analogy between

(a) Hernia cerebri

(b) Hernia testis

is that both are due to sepsis, are protrusions from the cavity in which they normally lie and are not covered by their special membranes and so are not hernias in the real sense of the term.

## (III) INTRACRANIAL NEW GROWTHS

(76) A tumour disturbs the workings of the brain as a whole because of the interference with intracranial circulation.

(77) Methods of investigation in intracranial tumours

(1) Analysis of symptoms

(2) Neurological examination

(3) Visual fields and the retinae

(4) Estimation of endocrines

(5) Skiagraphy

(6) Encephalography and ventriculography

(7) Exploratory craniotomy

(78) Clinical features of intracranial tumours depend on

(1) Situation of the tumour

(a) Posterior fossa

(a) Early rise in intracranial tension

(β) Early affection of vital centres

(γ) Late mental symptoms

(b) Anterior fossa

(a) Focal signs

↓ (β) General tension signs

↓ (γ) Late affection of vital centres

(δ) Early mental symptoms

(2) Nature of the tumour

(79) The only early manifestations of an intracranial tumour may be epileptic seizures.

(80) Epileptic attacks for the first time in a person of middle age ? Frontal tumour

(81) In childhood and young adult life, *any progressive derangement of the functions of central nervous system* should lead to the suspicion of an intracranial tumour

(82) A steady progressive focal irritation or paralysis is the only true sign of an intracranial neoplasm.

(83) Bilateral intermittent headaches accompanied by any palsy ? Intracranial tumour

Every case of migraine should be thoroughly examined. In recurrent headaches, examine

- (a) The fundi
  - (b) Visual field
  - (c) X Ray skull
- (84) Disordered metabolism (pituitary dysf  
be an earliest sign of an intracranial
- (85) In children prominent intracranial tumour signs are
- (1) Vomiting
  - (2) Stiff neck
  - (3) Separation of sutures
  - (4) Papilloedema.
- (86) Symptoms and signs of slow rise in general intra  
cranial tension or cerebral tumour syndrome
- (a) Slow cerebation
  - (b) Headache
  - (c) Vomiting
  - (d) Slow pulse
  - (e) Subnormal temperature
  - (f) Optic neuritis
- } Even these are com  
paratively late signs.
- (87) Meningiomas are amongst the most important of  
intracranial tumours because they are curable.  
They indent the nerve tissue but do not invade it  
though invasion of the overlying cranium may be  
free. The main clinical signs are due to general  
rise in intracranial pressure unless the growth is  
situated over the active area.
- (88) Painless, very slowly increasing apparently un  
important swelling in the skull may be the only  
outward sign of an intracranial meningioma.
- (89) Chief signs of meningiomata
- (1) Epilepsy (a) Motor
  - (b) Sensory
  - (2) Focal signs
  - (3) Signs of rise in general intracranial tension
  - (4) Bone hyperostosis.
- (90) Gliomata 40% of all intracranial tumours
- (a) Astrocytoma benign cyst  
radically removable  
not radio-sensitive
  - (b) Glioblastoma adults  
locally malignant  
radio-sensitive  
decompression & irradiation
  - (c) Medulloblastoma children  
malignant + +  
rapid dissemination  
radio-sensitive  
decompression & irradiation



- (91) Characteristic groups of intracranial tumours :
- (A) Pituitary syndrome
    - (a) Visual signs
    - (b) X Ray changes
    - (c) Endocrine disturbance
  - (B) Acoustic syndrome
    - (a) Unilateral deafness
    - (b) Disturbed equilibrium
    - (c) Pressure signs.
- (92) Cerebellar tumours of 4th ventricle
- (1) Medulloblastoma
  - (2) Ependymoma
  - (3) Astrocytoma
    - (a) It is rare to have a tumour in the posterior fossa between 40 and 60 except auditory neuro-fibroma
    - (b) Vast majority of patients with cerebellar tumour are below 40
    - (c) Prominent symptoms are
      - (α) Headache
      - (β) Vomiting
      - (γ) Papilloedema
      - (δ) Nystagmus
      - (ε) Ataxia
- } absent in 25% of cases.
- (93) Unexplained vomiting in children ? cerebellar medulloblastoma.
- (94) A child who complains of headache before breakfast and vomits ? cerebellar medulloblastoma.
- (95) Cerebral vomiting + neck spasm in the absence of meningitis, are indications of subtentorial tumours.
- (96) Intracranial tumours in childhood
- (1) Cerebral tuberculoma
  - (2) Congenital hypophyseal tumour
  - (3) Cerebellar medulloblastoma
- (97) The most common age incidence in intracranial tumours
- (1) Children and young adults (See above)
  - (2) Between 40 and 60
- Secondary malignant tumour
- (98) Bronchus is the commonest primary focus of a secondary metastatic tumour of the brain. Malignant melanoma is also a common primary focus.
- (99) Aneurysm is the commonest cause of isolated third nerve palsy
- (100) Monocular blindness Meningioma close to optic foramen

- (101) Patients coming to the neuro-surgeon for blindness, generally have
  - (a) Pituitary tumour
  - (b) Acoustic neuroma
  - (c) Cerebellar astrocytoma
  - (d) Anterior basal meningioma
- (102) Ventriculography or encephalography may produce acute symptoms and should not be done if they can not be followed by decompression operation if necessary
- (103) If 25 ccs. of cerebrospinal fluid can be drawn from one ventricle, there is no tumour in that hemisphere.
- (104) Asymmetry of lateral ventricles is a strong evidence of a cerebral tumour on the side of the smaller ventricle.
- (105) Diagnosis of an intracranial tumour is only made by the constant realisation of its possibility and knowledge of common typical syndrome.
- (106) Tumours of the skull must always be taken seriously however small and insignificant they may be.
- (107) Posterior fossa lesions apart from malignant medulloblastoma of childhood are much more favourable than any hemispherical tumour
- (108) Most fatal intracranial tumours are
  - (1) Tuberculomata 29%
  - (2) Metastatic tumours 21%
  - (3) Gliomata 19.5%
- (109) Tumours most amenable to surgical removal
  - (a) Meningioma
  - (b) Pituitary adenoma
  - (c) Suprasellar cranio-pharyngioma
  - (d) Acoustic neuro-fibroma
- (110) It is wiser to open the skull in doubtful cases and run the risk of unnecessary operation than run the risk of allowing a patient to be blind from optic atrophy
- (111) From surgical treatment point of view brain tumours can be divided into following groups
  - (A) Encapsuled or infiltrating
  - (B) Accessible or inaccessible
    - (1) Encapsuled accessibles
      - (a) Meningiomata
      - (b) Acoustic neuro-fibromata
    - (2) Infiltrating accessibles
      - Gliomata.
- (112) Two most common tumours which are met within the hemispheres are

- (a) Meningioma
- (b) Glioma.
- (113) Treatment of cerebral tumours
  - (A) Radical
    - (a) Innocent cortical tumours
    - (b) Acoustic tumour
    - (c) Cysts
  - (B) Palliative
    - Malignant, infiltrating or inaccessible tumours with
      - (a) Persistent headache
      - (b) Failing eyesight
      - (c) Epileptic fits
      - (d) Vomiting
      - (e) Insomnia.
- (114) No form of radiotherapy should be given through an intact skull as it raises the intracranial tension due to oedema of the brain which may be fatal.
- (115) Preliminary decompression is essential in
  - (1) Irradiation of intracranial tumours
  - (2) Antisyphilitic treatment in syphiloma.

#### (IV) TREPHINING

- (116) Craniotomy Osteoplastic opening of the skull with replacement of the bone.  
Craniectomy Removal of bone from cranium.
- (117) Site of choice in palliative decompression
  - (A) Local directly over the lesion
  - (B) If no localisation
    - (a) Subtemporal
      - (a) Unilateral
      - (b) Bilateral
    - Ind Anterior chamber tension
    - (b) Suboccipital
      - Ind Posterior chamber tension
- (118) Supratentorial tumours are exposed through osteoplastic flap craniotomies, while infratentorial tumours are explored through suboccipital craniectomies.
- (119) Direct craniectomy with dural opening should never be done
  - (a) Over the site of a cerebral tumour
  - (b) Over the motor cortex
    - Unless the cause is removable. In both these cases, decompression can be effected by extensive bone removal without dural opening
- (120) The flap of the scalp should always be bigger than the bone flap as far as possible no defect in the

scalp should overlap a defect in the skull  
to avoid (a) Intracranial infection  
(b) Open hernia cerebri.

- (121) In trephining
  - (a) Keep the pin on sound bone
  - (b) Do not forget to remove the pin after settling
  - (c) Test the depth every now and then on all sides
  - (d) Separate the dura before nibbling
- (122) If after trephining the dural condition shows very high intracranial pressure tap the ventricles before opening the dura.
- (123) Do not suture the dura mater after cerebellar operations.
- (124) Haemorrhage during trephine operation
  - (a) Special clamp
  - (b) Muscle or postage graft
  - (c) Plugging
- (125) For any haemorrhage, press on a piece of living muscle to the bleeding surface for a minute or two.
- (126) There are no sensations deep to the pericranium.
- (127) Uncontrollable pain persisting after 24 hours after operation on the cranium is suggestive of internal haemorrhage.

## EPILEPSY

- (128) Idiopathic epilepsy rarely starts in adult life.
- (129) Epileptic attacks starting for the first time in adult life
  - ? (1) General paralysis of the insane
  - ? (2) Intracranial tumour
  - ? (3) Cerebral abscess, adhesions fibrosis

## ACOUSTIC TUMOUR

- (130) In acoustic neuro-fibroma look for other signs of generalised neuro-fibromatosis.
- (131) Symptoms in cerebello-pontine acoustic tumour
  - (1) Headache
  - (2) Deafness
  - (3) Blindness (a) Choked disc  
                  ↓ (b) Optic atrophy
  - (4) Vomiting
  - (5) Fits
  - (6) Psychic changes
  - (7) Facial (a) Spasms  
             (b) Paresis
  - (8) Pyramidal signs
  - (9) Trigeminal anaesthesia
  - (10) Cerebellar signs
  - (11) Dysarthria
  - (12) Dysphagia

## CHAPTER II

# THE SPINE AND SPINAL CORD

## I ANATOMY:

### (A) Sensory localisation in the spinal cord

<i>Segment</i>	<i>Area</i>
C. 1 2, 3	Scalp
C. 2, 3, 4 5	Neck and upper part of the chest
C. 4 5	Shoulder
C. 5, 6	Arm outer side
C. 6, 7	Forearm hand-thumb radial side
C. 7 8 D. 1	Arm inner side
	Forearm-hand ulnar side
	Finger tips
D. 1-9	Front of the thorax
D. 6-7	Ensiiform area
D. 7-L. 1	Abdomen
D. 10, 11	Umbilicus
D. 12, L. 1	Buttock upper part
L. 1, 2	Groin and scrotum
L. 2 3 4 5	Thigh (a) outer side (b) front (c) inner side
L. 5 S. 1 2, 3	Buttock : lower part
	Thigh back side
	Leg inner side
	Leg and foot except inner side
S. 3, 4 5	: Perineum and anus
Coccygeal	: Skin from coccyx to anus

### (A1) Levels on the trunk of sensory nerve distribution:

(a) Suprasternal notch	3 & 4 C.
(b) Nipples	: 4 D.
(c) Ensiiform cartilage	7 D.
(d) Umbilicus	: 10 D.
(e) Ant. sup. iliac spine	12 D.
(f) Scrotum	1 & 2 L.
(g) Perineum and anus	3 4 5 S.

### (B) Motor distribution for individual segments:

<i>Segment</i>	<i>Important muscles supplied.</i>
C. 1	Small flexors of the head Depressors of the hyoid
C. 2	: Sternomastoid rotator and flexor of the head Small rotators of the head

<i>Segment</i>	<i>Muscles</i>	<i>Actions</i>
C. 3	Levator scapuli Sterni Trapezius	elevator of upper scapular angle lateral flexors of the neck (a) extensor and deviator of head (b) rotator of scapula
C. 4	Diaphragm	respiration and coughing
C. 5	Deltoid Sterni Teres minor Rhomboids	flexor extensor & abductor of arm abductor and everter of arm abductor and everter of arm retractors and elevators of scapula
C. 6	Biceps Coraco-brachialis Brachialis anticus Supinator longus	flexor and supinator of forearm flexor and adductor of arm flexor of the forearm flexor and supinator of forearm
C. 7	Triceps Extensors of wrist and fingers	extensor of forearm and arm
C. 8	Flexors of wrist and long flexors of fingers	
D. 1	Muscles of thenar and hypothenar eminences Interossei Lumbricales Oculo-pupillary fibres	abductors and adductors of fingers flexors and extensors of fingers
H. 2-12	Intercostals	respiration
D. 7-12	Abdominal wall	respiration compression of viscera
L. 1, 2	Iliopsoas Quad. lumb.	flexor and everter of the thigh deviator of chest
L. 3	Quadriceps ext.	extensor of the leg
L. 4	Adductors femoris	adductors of the thigh
L. 5	Tibialis anticus Ext. dig. long Extensor hallucis	plantar flexor and invertor of foot extensor of toes extensor of great toe
S. 1	Gastrocnemius Hamstrings Long flexors of the toes	plantar flexor of the foot flexor of the leg flexors of the leg
S. 2	Glutei Intrinsic muscles of the foot	extensor abductor and everter of the thigh
S. 3, 4, 5	Perineal musculature of	(a) defecation (b) micturition

### (C) Localisation of reflex centres in the spinal cord

C. 5, 6	Scapulo-humeral reflex
C. 5, 6, 7	Elbow and wrist jerk
D. 4-7	Epigastric upper abdominal reflex

- D. 8-L. 1      Lower abdominal reflex  
 L. 1, 2, 3      Cremasteric reflex  
 L. 2, 3, 4      Knee jerk  
 L. 4, 5 & S. 1      Gluteal reflex  
 L. 5, S. 1      Tendo Achilles jerk    ankle clonus  
 S. 1, 2, 3      Plantar reflex

(D) **Cauda equina** contains

- (1) Motor and sensory fibres to
  - (a) Lower limbs
  - (b) Perineum
  - (c) External genitalia
- (2) Bladder and rectum

(E) **Superficial relations of the spine and spinal cord :**

- (a) (1) Uppermost spine to form visible projection is 7C.  
 (2) Twelfth rib is a useful guide to 12D  
 (3) Intercostal line passes between 3rd and 4th lumbar spines
- (b) The cord ends below at the level of the space between the 12th dorsal and 1st lumbar spines
- (c) Intra-spinal course increases regularly for the cervical and thoracic nerves

<i>Region</i>	<i>Level of exit</i>
(1) Upper cervical	depth of one vertebra
(2) Lower cervical	opposite second spine above (6C. nerve opposite 4C. spine)
(3) Upper dorsal	opposite third spine above (5D nerve opposite 3D spine)
(4) Lower dorsal	opposite fourth spine above (9D nerve opposite 6D spine)
(5) All lumbar	opposite 10D and 11D. spines
(6) All sacral	opposite 12D spine between 12D and 1L. spines

- (d) At the 8th cervical nerve, the relation of the nerves to denominating vertebrae changes
  - (1) Above 8C : nerve issues above corresponding vertebra
  - (2) Below 8C : nerve issues below corresponding vertebra
- (e) The theca extends down to 2 S Vertebra

## (II) **CONGENITAL ABNORMALITIES:**

(1) **SPINA BIFIDA** Rachischisis

Def Failure of fusion of vertebral arches, associated with maldevelopment of spinal cord and membranes





- D. 8-L. 1      Lower abdominal reflex  
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Etiology	Site	Lumbodorsal Cervical Lumbosacral
Incidence		1 in 900 births
with Varieties	Keiller's classes	(Med. Ann. 1931)
	(1)	Primary mesoblastic error <i>Rachischisis incompleta restricta</i> (a) Spina bifida occulta (b) Meningocele
	(2)	Primary mesoblastic } error + Secondary ectodermal } (a) Myelo-meningocele (b) Hydro or syringo-myelo-meningocele
	(3)	Primary ectodermal } error + Secondary mesoblastic } Myelocoele restricta partialis-totalis
Theories	(a)	Failure of the medullary groove to close
	(b)	Failure of the mesoblast to unite in the midline separating the spinal cord from the skin
Varieties	(A)	Spina bifida <i>Laminar defect</i>
	(1)	Spina bifida occulta Failure of neural arches to unite unassociated with any protrusion of the membranes or cord the defect sometimes being protected by some tumour or a tuft of hair over it
	(2)	Meningocele Protrusion of meninges with cerebro-spinal fluid, through a spino-laminar defect, with spinal cord in its normal position
	(3)	Myelo-meningocele Meningo-myelocoele Spinal cord or cauda equina courses through the meningeal herniation through the laminar gap
	(4)	Hydro-myelo-meningocele Syringo-myelocoele Dilatation of central canal of the cord, which lies in the meningeal herniation through the laminar gap
	(B)	Rachischisis <i>Unclosed neural furrow</i> Failure of the closure of neural furrow due to arrest of development

- (1) **Complete Myelocoele totalis**  
Whole unclosed cord exposed on skin surface
- (2) **Partial: Myelocoele partialis**  
Cord exposed on the skin surface in
  - (a) Thoracico-lumbar region
  - (b) Lumbo-sacral region
- (3) **Open myelo-meningocoele:**  
Myelocoele restricta  
Cord exposed on the skin surface, raised on a cystic swelling containing cerebro-spinal fluid
- (C) **Anterior rachischisis or spina bifida**  
Anterior defect in the vertebral bodies associated with protrusion of the membranes or cord anteriorly

#### Clinic

- (1) **Local examination**
  - (A) **Spina bifida occulta** *most common*
    - (a) Abnormal overlying skin
    - (b) Overlying lipoma
    - (c) Nothing abnormal clinically
  - (B) **Meningocoele**  
Myelo-meningocoele  
Hydro-myelo-meningocoele }  
Cystic translucent swelling in the midline over the spinal column with or without opaque areas
    - (a) Communicating reducible impulsive
    - (b) Non-communicating non-reducible  
" non-impulsive
  - (C) **Myelocoele** *incidence next to (A)*
    - (a) Area medullo-vasculosa
    - (b) Zona epithelio-serosa
    - (c) Central canal opening
 Extent (a) Whole totalis  
(b) Regional partialis  
(c) Local restricta
  - (D) **Open myelo-meningocoele**  
Myelocoele protruding over the surface of an underlying meningeal cystic swelling
- (2) **Nervous disturbances**  
Due to implication of the spinal cord itself by
  - (a) Involvement
  - (b) Pressure
  - (c) Traction

- Signs (1) Paralysis with deformities: lower limb  
 (2) Paralysis of sphincters bladder  
 (3) Trophic changes perforating ulcers
- (3) Associated congenital abnormalities  
 (1) Talipes  
 (2) Abnormalities of external genitalia  
 (3) Abnormalities of face  
 (4) Hydrocephalus  
 (a) Pre-operative  
 (b) Secondary post-operative
- (4) Special signs  
 (a) Transillumination In  
 (a) Meningocele  
 (b) Myelo-meningocele  
 (r) Syringo-myelocele } opaque areas  
 (b) X Rays  
 (a) Ordinary  
 (b) After replacement of fluid by oxygen  
 (1) Antero-posterior  
 (2) Lateral

- Compl (1) Incompatibility with life complete myelocele  
 (2) Rapid increase in size  
 (3) Dermatitis or ulceration  
 ↓ (4) Rupture  
 ↓ (5) Infection → meningitis  
 (6) Paralysis  
 (a) From birth  
 (b) 9th to 17th year  
 Due to traction by membrana reunens  
 in spina bifida occulta
- (7) Hydrocephalus  
 (8) Associated congenital deformities  
 (9) Paralytic deformities talipes

## Treat

- (1) Conservative Protection by celluloid cup  
 Ind (a) Rachischias  
 (b) Upto five years of age  
 (c) Too severe complications
- (2) Operative  
 Ind (a) Meningocele  
 (b) Spina bifida occulta with symptoms  
 (c) Advent of complications
- Age (a) Myelocele 3-7 days after birth  
 (b) Meningocele  
 (a) Early within 4 weeks of birth  
 (b) Late after 2-5 years  
 (r) Immediate  
 Advent of complications

## (A) Excision and repair:

Tech (a) Elliptical incisions

↓ (b) Ligation of pedicle

or (b) Open the sac

↓ (c) Return the contents

↓ (d) Superimposition of flaps

↓ (e) Superimposition of lumbar fascia

## (B) Drainage into the tissues

Into peritoneal cavity by silk threads

## (C) Excision of membranous residuals

Ind Late onset of paralysis in spina bifida occulta

Post. treat Nursing in prone reversed position

Urotropine sulphonamides

Post. compl (1) Cerebrospinal fluid leakage

Reversed position

(2) Infective meningitis Urotropine asepsis

(3) Convulsions Dehydration treatment

(4) Paraplegia

(5) Hydrocephalus Preserve the sac

## (2) SACRO-COCYGEAL ABNORMALITIES

Path (1) *Anomalous development in early embryo:*

## (A) Parasites

## (B) Sacro-coccygeal teratoma: Mixed

(a) Solid

(b) Cystic

(2) *Persistence of rudimentary structures*

## (A) Neurenteric canal remnant:

Ventral to sacrum and coccyx

## (B) Post anal: (a) Cyst

(b) Sinus

(c) Fistula

Origin Filum terminale extremity

Site Tip of the coccyx, behind the anus

(3) *Inclusion dermoids*(4) *Chordoma*

## Clinical varieties

(A) *Posterior lesions*

Sacro-coccygeal or pilonidal cyst or sinus:

Etio Congenital malformation

Path (a) Faulty coalescence of skin

Sequestration dermoid

(b) Lack of closure of neurenteric canal

Clinic (a) Tender swelling

or (b) Single or multiple openings

- (a) Lined by skin  
 and (B) Discharging (1) serous fluid  
   or (2) pus  
   or (3) hair
- Site (a) Midline  
 (b) Over the lower sacrum  
 (c) Between the buttock folds
- Diff. diag. Fistula in-ano or bone necrosis
- Compl. Recurrent inflammations
- Treat (1) Excision and drainage  
 (2) Excision and packing  
 (3) Excision and primary suture
- Contraind. Acute inflammation
- Anaesth. Local
- Tech. Complete removal  
 Obliteration of dead spaces  
 Copious dressings  
 Adhesive strapping  
 Sutures out on 4th day
- Post. compl. Infection
- (B) *Anterior lesions*
- (1) Dermoids  
     (a) Perineal  
     (b) Proctodeal  
     (c) Neurenteric  
     (d) Post-anal
- (2) Meningeal cyst : Meningocele
- (3) Teratomata
- Diff. diag. Intrapelvic growths : uterus, ovaries
- (C) *Anterior or posterior lesions*
- Chordoma Tumour of the noto-chord
- (1) Spheno-occipital  
 Age 30-40  
 Tumour involving : spheno-occiput  
   nasopharynx  
   orbit  
   air sinuses
- (2) Sacro-coccygeal  
 Site In front of or behind the sacrum  
 Clinic Slow large, infiltrating  
 Treat Local removal
- (3) CERVICAL RIB (See under Nerves)

## (III) TRAUMA:

## (A) SPINAL SPRAIN

- Path (a) Ligaments  
 (b) Muscles

Clinic (a) Localised pain on particular movement stretching the sprained structure

(b) Localised tenderness

(c) Localised spasm

(d) Localised boggyiness

(e) X Ray negative

Treat (a) Rest in bed → massage and movements

(b) Leriche's novocain treatment

## (B) SPINAL DISLOCATION

Site Cervical region

Path (1) Unilateral dislocation

Morb. anat Lower process of upper vertebra

— displaced anteriorly over —

Upper process of lower vertebra

Clinic Head (a) Turned to opposite side

(b) Flexed to same side

(2) Unilateral subluxation

Clinic Head (a) Turned to opposite side

(b) Flexed to opposite side

(3) Bilateral dislocation :

Morb. anat Upper vertebra

— displaced anteriorly over —

Lower vertebra

Clinic Head displaced forward

Clinic (1) Deformity

(a) Inspection

(b) Pharyngeal palpation

(2) Spasm and immobility

(3) Root pains

(4) Cord signs

(a) Between occiput and atlas

Clinic instantaneous death

(b) Between atlas and axis

Eti (a) Hanging

(b) Ear-lift

Clinic Death due to shock and respiratory paralysis

(c) Between C. 5 and C. 6 :

Eti (a) Diving

(b) Falls on the head

(c) Wrestling

Compl Cord involvement with all its sequelae

Treat (A) Conservative Closed reduction

Tech (a) Anaesthesia : Local

(b) Reduction Traction + counter traction

(a) Unilateral

Lateral flexion to opposite side

(b) Bilateral extension

(c) Immobilisation  
 By Plaster of Paris  
 Extent Pelvis → vertex → eyebrows

(B) Operative Open reduction  
 Ind Failure of closed reduction  
 Tech (a) Exposure  
 (b) Reduction after  
 (a) Manipulations  
 or (β) Excision of processes

### (C) SPINAL FRACTURE

(1) Compression fracture of the vertebral body

Site 12 D 1 L.

Cause Flexion + compression falls from height

Clinic (a) All local signs of fracture (See page 810)

(b) No spinal cord involvement

(c) X Ray (α) Antero-posterior  
 (β) Lateral  
 (γ) In flexion  
 (δ) Delayed

Diff. diag (1) Spinal sprain  
 (2) Scheuermann's disease  
 (3) Congenital wedge vertebra  
 (4) Pathological fracture

Sequelæ (α) Kummell's disease  
 (b) Deformity

(2) Fracture of the laminae  
 (3) Fracture of spinous processes  
 (4) Fracture of transverse processes }

Etio Direct injury

Clinic (a) Local signs of trauma  
 (b) Crepitus may be present  
 (c) X Ray

Compl (a) Injury to ureters

In fracture of the transverse process

(b) Injury to the cord in fracture of the laminae

Treat (1) Slight cases  
 Strapping and bandaging for 3 weeks

(2) Avulsions

(A) Immobilisation

By Plaster jacket

Extent Lower pelvis to nipple

For 6 to 8 weeks

↓ (B) Spinal exercises from 3rd week

↓ (C) Resumption of work after 12-24 weeks

sequelæ (1) Fibrous repair  
 (2) Adhesions  
 (3) Chronic persistent backache



**(D) FRACTURE-DISLOCATION :**

Varieties	(1) Compression fracture (C): with displacement (2) Oblique fracture of the body With displacement
Cause	Indirect trauma fall from height
Site	(a) <b>Cervico-dorsal</b> (b) <b>Dorsi-lumbar</b>
Path	(a) <b>Fracture :</b> With anterior and downward displacement of upper fragment (b) <b>Cord injury</b> By upper and post. edge of lower frag
Clinic	(1) <b>Deformity</b> Angular (2) <b>Pain</b> local and referred (3) <b>Tenderness</b> (4) <b>Spasm</b> (5) <b>Spinal involvement :</b> Due to (a) <i>Concussion</i> (b) <i>Contusion and laceration</i> (c) <i>Transection</i> (d) <i>Compression</i> (6) <b>X Ray</b> (a) Antero-posterior (b) <b>Lateral</b>
Clinical types	(A) <b>Fracture-dislocation</b> <b>Without paraplegia</b> (B) <b>Fracture-dislocation</b> <b>: With paraplegia</b> (C) <b>Fracture-dislocation</b> <b>: With threatened paraplegia :</b>
Cause	<b>Dislocation of intact articular process of the upper vertebra over the lower one</b>
Diag	(a) <b>Lateral X Ray</b> (b) <b>Paraplegia worse on hyper extension</b>
Treat	<b>Excision of the art. processes :</b> <b>Under local anaesthesia</b>
Compl	<b>Cord involvement</b> With all its sequelae

**(E) INJURY TO INTERVERTEBRAL DISC**

Etio	(1) <i>Falls from height</i> (2) <i>Flexion strains heavy lifting</i> (3) <i>Manipulations of the spine</i> (4) <i>Lumbar punctures</i>
Sex	<b>Men</b> between 20 and 50
Site	(a) <b>Disc</b> between L. 4 and L. 5 (b) <b>Disc</b> between L. 5 and S. 1
Path varieties	(1) <b>Rupture :</b> (a) <b>Pure</b>

(b) Associated with fracture vertebra

(2) **Retropulsion of nucleus pulposus :**

Through posterior common ligament into

(a) Spinal canal → cord pressure

(b) Intervertebral foramen → root pressure

(c) Vertebral body → bony ankylosis  
(Scheuermann)

(3) **Fibrosis and hypertrophy of lig. flava**

Clinic (1) History of trauma → sciatica

(2) Sciatic scoliosis

(3) Pressure signs

(a) Root signs root pains—sciatica

(b) Cord signs paralysed limb and sphinct.

(a) spastic

↓ (β) flaccid

(4) **Bony ankylosis**

In cases of prolapse into the vertebral body

(5) **Neurological Spinal block**

(a) Fluid normal or protein +

(b) Queckenstedt positive

(6) **X Rays**

(a) Routine plain

Diminution of inter vertebral space

(b) Air myelography

(c) Lipoidol myelography

Tech 5 c.c. of lipoidol between L 3 & L 4

↓ X Ray in prone position

↓ Filling defect

Diff. diag (1) **Sciatica**

(2) Back strain

(3) Spondylitis

(4) Spinal cord tumours

Treat (1) **Plaster or celluloid jacket**

(2) **Operative Laminectomy**

(A) Excision of protruding cartilage

(a) Extradural

(b) Intradural

(B) Dissection of ligamenta flava

(F) **SPINAL CORD INJURIES**

Etio (1) Lumbar fracture-dislocations

(2) Dorsal fracture-dislocations

(3) Cervical dislocations

Path (1) **Extension quadriplegia**

Immediate and short lived paralysis after  
sudden hyperextension of the spine

(2) **Spinal concussion**

Immediate paraplegia below the segment, with spontaneous recovery accompanying every well-marked fracture spine

(3) **Organic lesions of the cord**

(A) *Immediate*

- (1) Contusion
  - (2) Laceration
  - (3) Transection
  - (4) Haemorrhage
    - (a) Extrathecal
    - (b) Intrathecal
    - (c) Intramedullary
    - (d) Ingravescant Thorburn
- Gravitational paraplegia

(B) *Delayed*

- (1) Softening: Myelitis
- (2) Sepsis Meningitis
- (3) Meningitis serosa circumscripta

*Clinical varieties of spinal cord lesions*

(1) **Spinal shock or concussion**

(A) **Sensory Anæsthesia**

(B) **Motor**

- (a) Immediate onset
- (b) Bilateral flaccid paralysis  
Below the affected segment
- (c) Spontaneous recovery Within three weeks

(C) **Reflexes**

Complete disappearance of all superficial and deep reflexes below the level

(D) **Visceral**

- (a) Bladder incontinence or retention
- (b) Anal incontinence or retention

(2) **Spinal compression**

**Causes**

- (a) Œdema
- (b) Bone or foreign body
- (c) Haemorrhage
- (d) Inflammation
- (e) Adhesions
- (f) Cystic meningitis

**Path**

Signs depend on

- (a) Extent of cord interruption
- (b) Site of cord compression

**Clinic**

- (a) Irritation above the level
- (b) Lower neuron paralysis at the level
- (c) Upper neuron paralysis below the level

**Treat**

- (1) Reduction of deformity ~
- ↓ Fixation in hyperextension

- (2) **Operative treatment** Laminectomy  
 Ind (a) Incomplete lesions  
 (b) Within two months
- (3) **Spinal hæmorrhage**  
 (A) **Extradural**  
 (1) **Thorburn's gravitation paraplegia**  
 Progressively ascending  
 (a) Irritation  
 ↓ (b) Paraplegia  
 (2) Root pains  
 (B) **Intradural** Blood in c. s. f  
 (C) **Intramedullary**  
 (1) Flaccid paralysis  
 (2) Absence of pain and irritation  
 (3) Dissociation of sensations  
 (4) Limited extent of the lesion
- (4) **Spinal destruction**  
 (A) **Complete transection of the cord**  
 Presence, after three weeks, of following signs
- |          |  |   |
|----------|--|---|
| Complete | (1) <b>Sensory</b>                               | (a) Hyperæsthesia of the segment above        |
|          | {  | (b) Anæsthesia of the segment affected        |
|          |  | (c) Anæsthesia of the segments below          |
|          | (2) <b>Motor</b>                                 | (a) Spastic muscles of the segment above      |
|          |  | (b) Flaccid paralysis of the segment affected |
|          |  | (c) Spastic paralysis of the segments below   |
|          | (3) <b>Attitude</b> Paraplegia in flexion        | (a) Flexion-adduction of hips                 |
|          |  | (b) Flexion of knees                          |
|          | (4) <b>Reflexes</b> Development of mass reflex : | Stimulation of the sole                       |
|          |  | ↓ Flexor spasms of lower limb                 |
|          |  | + Automatic emptying of bladder               |
|          | (5) <b>Visceral</b>                              | (a) Bladder (a) Retention                     |
|          |  | ↓ (b) Automatic bladder                       |
|          |  | (b) Rectum constipation                       |
|          | (6) <b>Trophic</b> Bed sores                     |   |

*Stages of complete cord lesion*

- (1) **Stage of complete inhibition and flaccid paralysis**  
 ↓ (2) **Three weeks**  
 ↓ (3) **Stage of reflex establishment**  
 (a) Spastic paraplegia in flexion  
 (b) Mass reflex  
 (c) Reflex or automatic bladder

**(B) Incomplete transection of the Cord :***Signs as in complete transection, except*

- (a) Incomplete nature of signs
- (b) Paraplegia in extension
- (c) Absence of mass reflex

*Special signs of cord injuries at different levels***(A) Cervical segments :**

- General
- (a) Wide paralysis
  - (β) Absence of unconsciousness
  - (γ) Contracted pupils
  - (δ) Wide variations of temp.

**(1) Above C 5**

- (a) Paralysis of all respiratory muscles
- (b) Complete quadriplegia

**(2) C 5 Complete flaccid paralysis of all arm muscles**

- (3) C 6 (a) Arms abduction + eversion
- (b) Forearms flexion + supination

- (4) C 7 (a) Arms flexion + adduction
- (b) Forearms flexion + pronation  
(Forearms on chest)

**(5) C 8 D 1****(a) Flaccid paralysis of :**

- (a) Flexors of wrist and fingers
- (β) Intrinsic muscles of the hand

**(h) Spastic paralysis of**

- (a) Intercostals
- (β) Abdominal muscles
- (γ) Lower limbs

**(B) Dorsal segments**

- (1) D 1 (See above)
- (2) D 2 (a) Contracted pupils
- (b) Hyperæsthesia along inner arm
- (3) D 3-12
- (a) Girdle hyperæsthesia
- (b) Weak forced expiration and cough
- (c) Spastic paraplegia

**(C) Lumbar enlargement**

- (a) Active urinary incontinence
- (b) Active faecal incontinence  
With patulous anus.

**(D) Cauda equina****Path** Behaves as posterior nerve roots

- (a) Severe and persistent pain
- (β) Spontaneous recovery
- (γ) Delayed automaticity of bladder

- Clinic (a) Anaesthesia of lower limbs & perineum  
 (b) Flaccid paralysis of lower limbs & perineum  
 (c) Abolition of lower reflexes  
     (a) Plantar  
     (β) Cremasteric  
     (γ) Anal  
     (δ) Bulbo-cavernosus  
 (d) Paralysis of  
     (a) Bladder with retention  
     (β) Rectum with constipation  
     (γ) Genitals

(E) Sacral roots

- (a) Saddle anaesthesia  
 (b) Flaccid paralysis of posterior lower limb muscles  
 (c) Paralysis of bladder rectum & genitals

*Complications of fracture spine*

(A) FRACTURE ITSELF

- (1) Malunion Deformity  
 (2) Intervertebral disc injury / Ankylosis  
 (3) Kummell's disease Traumatic osteoporosis  
 (4) Osteoarthritis  
 (5) Spinal neurasthenia Railway spine  
 (6) Aggravation of pre-existing disease  
 (7) Tuberculosis of spine

(B) CORD INVOLVEMENT

- (a) Immediate Concussion  
 (b) Intermediate (1) Destruction  
                       (2) Compression  
                       (3) Inflammation  
                           (a) Meningitis  
                           (β) Myelitis  
 (c) Delayed (1) Fibrosis and adhesions  
                   (2) Meningitis serosa circumscripta

(C) OTHER SYSTEMS

- (1) Lungs Pneumonia  
 (2) Bladder

- Path Factors (a) Loss of motor innervation  
                   ↓ (b) Poor emptying  
                   ↓ (c) Stagnation of urine  
                   ↓ (d) Atony + infection

- Path anat (a) 2nd and 3rd lumbar Sympathetic  
 Functions (a) Detrusor inhibition  
               (b) Sphincter stimulation

Clinic Paralysis

↓ Active incontinence

- (b) 2nd and 3rd sacral Parasympathetic

- Functions (a) Detrusor stimulation  
(b) Sphincter inhibition

Clinic Paralysis

↓ Retention

Causes of infection

- (a) Frequent catheterisation  
(b) Auto-infection

Clinical groups

- (1) Retention  
(2) Incontinence :  
(a) Active 2, 3 L.  
(b) Passive (Overflow) 2, 3 S.  
(3) Automatic bladder  
(4) Uræmia  
(5) Urinary sepsis

- (3) Rectum (a) Ileus  
(b) Constipation  
(c) Incontinence  
Lumbar involvement  
(4) Genitals (a) Priapism esp. in cervical lesions  
(b) Impotence :  
Caudal and sacral involvement

- (5) Motor paralysis and its sequelæ :  
Contractures  
Deformities

- (6) Trophic Bed-sores

(D) GENERAL

- (1) Shock  
(2) Association with other injuries

Treatment

(I) FIRST AID

- (A) Immediate immobilisation and removal to hospital  
(a) In prone position  
or (b) On hyperextension stretcher  
(B) Treatment of shock  
(C) Attention to other injuries

(II) REDUCTION AND FIXATION

- (1) Anaesthesia :  
(a) Local (b) Paravertebral (c) General  
(2) Hyperextension with moulding  
(a) Davis suspension technique  
(b) Watson Jones postural reduction  
(a) Two tables technique  
(β) Leg raising technique  
(3) Plaster fixation :  
Pelvis to axillæ and clavicles  
For 4 to 6 months

- (a) Complete
- (b) Double shell
- (c) Single shell
  - (a) Anterior
  - (b) Posterior
- or (3) Reversible bed-frame of Hey Groves
- (4) Ambulation and exercises (Bohler)
- (A) Treatment of lumbar fractures
  - (1) First aid carriage prone with hyper-extension
  - (2) Initial X Ray
  - (3) Anaesthesia not necessary
  - (4) Preparation
    - (a) Stockinet
    - (b) Pads over bony points
    - (c) Two tables high and low
    - (d) Plaster material
  - (5) Position prone + hyper-extension  
Trunk entirely unsupported
  - (6) Plaster jacket
    - (a) Ant symphysis—groin—trochanters  
↓ Clavicles ↓
    - (b) Lat trochanters  
↓ axillae ↓
    - (c) Post gluteal cleft  
↓ scapulae ↓
  - (7) After-treatment
    - (a) Abdominal window  
Ind (a) Respiratory distress  
(b) Abdominal distension
    - (b) Change of position every two hours  
Sit up after 24 hours  
Walk after 8-10 days
    - (c) Spinal and abdominal exercises
    - (d) Check X Ray and new plaster  
After 4 weeks.
    - (e) Retention of jacket  
16 to 24 weeks (Renewed every 6 weeks)
    - (f) Mobilisation exercises  
After discarding the jacket
- (B) Treatment of dorsal fractures :
  - (1) Position  
Supine with kidney bridge under the fractured vertebra
  - (2) Plaster From pelvis to chin
- (C) Treatment of cervical injuries
  - (1) Crush fracture
- Fixation
  - In Patient looking to the ceiling
  - By Plaster-of-Paris
  - Extent Pelvis → vertex → eyebrows
  - For 12 weeks
  - (2) Sprain Felt surgical collar for a few weeks



(3) Subluxation As in (1)

(4) Recurrent subluxation

(A) Immobilisation in plaster for 16 weeks

(B) Operative fusion by bone graft

↓ Plaster fixation for 24 weeks

(5) Dislocation

Treat (A) Traction and manipulations under anesthesia

or (B) Skeletal weight traction by callipers

(a) Galle's 20-30 lbs. for 10-15 min.

(b) Prolonged for 3 weeks

After-treat Fixation

In Neck hyper-extended

By Plaster cast

Extent: Head III upper thorax

(D) Treatment of vertebral fractures with paraplegia

(1) First aid: Keep the spine straight

Never allow the spine to sag

(2) Immediate reduction and fixation

(a) Lumbar: Plaster jacket

(b) Dorsal: Plaster bed + skeletal traction

(c) Cervical: Skull traction

(3) Treatment of complications: (See below)

(4) After-treatment:

Plaster jacket on recovery from paraplegia

### (III) TREATMENT OF COMPLICATIONS

(1) Chest Anti pneumonic preventive treatment

(2) Bladder

(a) Urinary antiseptics and diuretics

(b) Manual expression: Every 4-6 hours

(c) Distension and overflow

(d) Aseptic catheterisation

(a) Intermittent

(b) Continuous

(e) Suprapubic cystostomy

Ind (a) Cauda equina lesion

(b) Urinary infection

(r) Uræmia

(3) Rectum

(a) Acetyl choline for ileus

(b) Flatus tube

(c) Laxatives

(d) Turpentine enemata

(4) Priapism

(a) Aspiration of corpora

(b) Incisions into corpora

(c) Ligature of both dorsal arteries

(5) Paralysis

(a) Splints or bandages in optimum position

- (b) **Massage** in flaccid paralysis
- (6) **Trophic ulcers**
  - (a) Protection of all pressure points by **elastoplast**
  - (b) Changing positions
  - (c) Dryness + cleanliness  
Boxax, spirit, 1% formaldehyde
  - (d) Tannic acid treatment
- (7) **Plaster complications**
  - (A) Respiratory embarrassment
  - (B) Acute dilatation of the stomach
- Treat (1) Abdominal or chest window
- (2) Plaster shell
- (C) Plaster sores

#### (IV) OPERATIVE TREATMENT

##### (1) Fracture

Ind (A) **Early** Within two days

- (1) Compound fracture  
With leakage of c. s. f
- (2) Retention of foreign body
- (3) Depressed fracture of laminae  
With projection into the spinal canal
- (4) Impacted dislocation
- (5) Gravitation paraplegia of Thorburn

(B) **Delayed** From 3 to 8 weeks

- (1) Stationary in complete damage :  
Extensor reflex with no improvement
- (2) Partial recovery → stationary condition
- (3) Progressive damage due to compression
- (4) Late cord symptoms  
Serous meningitis
- (5) Pain In caudal lesions

Contraind (1) **Concussion period** First three weeks

- (2) Satisfactory progress
- (3) Complete transection syndrome
  - (a) Mass reflex
  - (b) Automatic bladder
  - (c) Paraplegia in flexion

Tech (1) Open reduction

- (2) Laminectomy
- (3) Excision of required parts

##### (2) Complications

- (A) **Obstinate urinary infection**  
Suprapubic cystostomy
- (B) **Bed sores** Nerve stretching
- (C) **Deformities**
  - (a) Tenotomies
  - (b) Tendon transplantations

- (c) Tenodesis
- (d) Arthrodesis
- (D) Hypertonus
  - (a) Tenotomies
  - (b) Nerve operation Stoffel
  - (c) Posterior rhizotomy Forster
- (E) Pain
  - (a) Posterior rhizotomy Forster
  - (b) Antero-lateral chordotomy Spiller

#### (IV) INFLAMMATIONS OF THE SPINE:

##### (A) TRAUMATIC INFLAMMATIONS

###### (1) KUMMEL'S DISEASE

*Def* Post traumatic, hyperæmic osteoporosis leading to collapse of a vertebral body

*Site* 12 D 1 L

- Clinic*
- (1) History of compression fracture
  - (2) Latent period 8 months to 8 years
  - (3) Pain + tenderness + wedge-deform.
  - (4) Paraplegia + girdle pain occasional
  - (5) X Ray Lateral

- Treat*
- (1) Conservative
    - (A) Hyperextension plaster
    - ↓ (B) Taylor's spinal brace
  - (2) Operative Bone-graft

###### (2) POST TRAUMATIC OSTEOARTHRITIS

Aggravation of previously present osteoarthritis by trauma

##### (B) INFECTIVE INFLAMMATIONS

###### (1) ACUTE INFECTIVE OSTEOMYELITIS:

*Etio* Age 5 to 15

*Inf* Staphylococcus aureus

- Path*
- (a) Primary staphylococcal focus
  - ↓ (b) Pyæmia
  - ↓ (c) Osteomyelitis: lamina or vertebral body
  - ↓ (d) Embolic infection of the fat
  - ↓ (e) Direct lymphatic extension

- Clinic*
- (1) Constitutional toxæmia
  - (2) Intense pain in the back
  - (3) Local acute inflammatory signs
  - (4) Referred signs of pressure paraplegia  
root pains

- Diff. diag*
- (1) Meningitis
  - (2) Acute abdomen

	(3) Acute fevers
	(4) Acute myositis or fibrositis
Compl	(1) Abscesses (a) Muscular (b) Extradural
	(2) Septic meningitis
	(3) Acute vertebral necrosis
	(4) Compression paraplegia
Prognosis	Bad
Treat	(A) Local
	(1) Free removal of bone
	(2) Drainage of the abscess
	(3) Support to the spine
	(B) General
	Antiseptic chemotherapy
	Sulphonamides group
	Vaccines
	Pharmasol manganese and tin

### (C) SPECIFIC INFLAMMATIONS

#### (1) TUBERCULOSIS OF THE SPINE

Syn	Pott's disease
Etio	Age (a) Children under ten (b) Adolescents
	Site (a) 10 D to 3 L (b) Cervical
Path : Origin	(A) Endosteal → angular deformity Children
	(B) Periosteal → gradual kyphosis Adults
Morb. amt	(A) Rarefying osteitis → Compression
	↓ (B) Ankylosis in angular deformity
	or (C) Caseation
	↓ (D) Cold abscess
	↓ (E) Migration
	or (F) Compression paraplegia
Clinic	(1) Pain (a) Local (b) Referred root pains
	(2) Tenderness (a) Local (b) Referred (a) Tap on head (β) Tap on sole
	(3) Spasm (a) Rigid back or neck (b) Restricted movements (c) Coin-on-the-floor test
	(4) Deformity (a) Prominent spinous process (b) Angular In children (c) Gradual In adults

- (a) Dorsal exaggerated kyphosis
- (β) Cervical or lumbar  
Lessened normal lordosis

### (5) Cold abscess

- Clinic (a) Non inflammatory cystic swelling  
(b) Migration to distant parts  
(c) Tendency to silent bursting

#### Sites (A) Cervical

- (1) Retropharyngeal
- (2) Posterior cervical
- (3) Axillary
- (4) Mediastinal

#### (B) Dorsal

- (1) Mediastinal
- (2) Paravertebral
- (3) Intercostal
- (4) Abdominal wall

#### (C) Lumbar :

- (1) Psoas
  - (a) Iliac
  - (b) Scarpa
  - (c) Gluteal
  - (d) Ischio-rectal
- (2) Paravertebral Lumbar

### (6) Compression spastic paraplegia

- Cause Pressure of inflammatory products
- (a) Pachymeningitis
  - (b) Edema
  - (c) Fibro-lipomatous sclerosis
  - (d) Cold abscess

#### Clinic (A) Early stage

- (1) Spastic paraplegia
- ↓ (2) Sensory disturbances
- ↓ (3) Loss of sphincter control

#### (B) Later stage of complications

- (1) Ascending urinary infection
- (2) Contractures
- (3) Bed sores

### (7) X Ray (A) Antero-posterior

#### (B) Lateral

- Pictures
- (1) Worm-eaten appearance
  - (2) Rarefaction
  - (3) Compression-collapse
  - (4) Shorter inter vertebral space
  - (5) Bony ankylosis
  - (6) Cold abscess shadow

*Clinical pictures at different levels***(A) Cervical**

- (1) Fixation of head
- (2) Pain in 2nd cervical nerve area
- (3) Straightening of cervical spine
- (4) Cold abscess
  - (a) Retropharyngeal
  - (b) Posterior cervical

**(B) Dorsal**

- (1) Rigid back
- (2) Intercostal or abdominal girdle pain
- (3) Local deformity kyphosis
- (4) Cold abscess
  - (a) Intercostal
  - (b) Paravertebral

**(C) Lumbar**

- (1) Rigid back
- (2) Hypogastric or sciatic pain
- (3) Straightening of lumbar spine
- (4) Cold abscess
  - (a) Lumbar
  - (b) Psoas

**Complications****(A) General**

- (1) Miliary tuberculosis
- (2) Tuberculous exhaustion
- (3) Amyloid disease

**(B) Distant**

- (1) Tuberculosis elsewhere
  - (a) T B meningitis
  - (b) T B. lungs
  - (c) T B. intestines
- (2) Intercurrent complications

**(C) Local**

- (1) Cold abscess
- (2) Compression paraplegia

**(D) Sequelae**

- (1) Urinary infection
- (2) Ileus
- (3) Chest complications
- (4) Bed-sores
- (5) Contractures

**Treatment**

**Aim** Bony ankylosis in the position of least deformity

- Steps**
- (1) Rest with correction of deformity
  - (2) Immobilisation of spine in corrected position
    - (A) Conservative Plaster jacket
    - (B) Operative Bone graft

- (3) Treatment of complications
- (4) Treatment in convalescence
- (1) Rest with correction of deformity
  - (A) Recumbency
    - In (a) Bed
    - (b) Hyper-extension frame
    - (c) Plaster bed
  - With } Weight extension and counter-extension
  - or }
  - Without }
  - Position (a) Hyper-extended supine
  - (b) Prone
  - Duration Disappearance of acute clinical signs
  - (B) Plaster-of Paris
- (2) Immobilisation of spine in corrected position
  - (A) Conservative
    - (1) Plaster-of Paris Jacket
      - Tech (a) Repeated plasters
      - After graduated corrections
      - (b) Plaster with local pressure
    - Extent (a) Cervical
      - : Iliac crests → chin and occiput
    - (b) Dorsal-lumbar
      - : Iliac crests → axillæ
      - + Symphysis pubis → suprasternum
    - Duration (a) Clinical and radiological ankylosis
    - (b) Two years average
    - (2) Splints: Double Thomas hip splint
    - (3) Frames Bradford
    - Whitman
    - Phelps
  - (B) Operative
    - Tech (1) Hibbs Interlocking of split spines
    - (2) Albee Tibial graft between split spines
    - Ind (1) Lumbar or lumbo-sacral lesion
    - (2) Puberty
    - (3) Late and stationary stage
    - (4) Healthy skin
    - (5) Fibrous painful ankylosis
    - (6) Laborious occupation
    - Contraind (1) Children
    - (2) Early and progressive cases
    - (3) Bad general and local conditions
    - Post. treat (a) Plaster shell (anterior) for two weeks
    - (b) Plaster jacket for six months
    - (c) Celluloid jacket for further six months
- (3) Treatment of complications
  - (A) Cold abscesses







- Etio** (a) Elderly people  
(b) Laborious occupations
- Path** (1) Bones osteophytes + bony hypertrophy  
(2) Ligaments ligamentous and capsular calcification and ossification (Syndesmophytes)  
(3) Blood rise in blood-calcium
- Clinic** (1) Pain (a) Local  
(b) Referred Root pains  
(2) Rigidity → immobility Poker back  
(3) Deformity Kyphosis  
(4) \ Rays (a) Osteophytes  
(b) Syndesmophytes
- Clinical types** (1) Marie-Strumpell  
(A) Spondylitis  
+ (B) Proximal arthritis  
Hips and shoulders  
(2) Von Bechterew  
Cervico-dorsal spondylitis with marked root pains
- Treat** (1) Treat all primary septic foci  
(2) Physiotherapy  
(3) Plaster fixation in painful stage  
(4) Para thyroidectomy unilateral  
lod High blood-calcium  
(5) Vasectomy

### (3) CHARCOT'S DISEASE

- Clinic** (1) Painless, irregularly angular kyphotic deformity  
+ (2) Tabes dorsalis syringomyelia

## (V) NEW GROWTHS OF THE VERTEBRAL COLUMN AND SPINAL CORD

- Etio** Age between 20 and 50  
(Tuberculoma under 10)

### Classification

#### (A) Tumours of the vertebrae

- (1) Chondroma
- (2) Osteoma
- (3) Angioma
- (4) Multiple myeloma
- (5) Primary sarcoma
- (6) Secondary carcinoma

**Primaries** Breast, thyroid, bronchus prostate, kidney stomach uterus

#### (B) Tumours in the spinal canal

- (1) Extradural 25%  
(a) Bony and cartilaginous growths

- (1) Secondary carcinoma
- (2) Sarcoma
- (3) Chondroma
- (4) Osteoma
- (5) Myeloma
- (6) Osteophytes
- (b) Lipoma
- (c) Neuro-fibroma
- (d) Hæmangioma
- (e) Chordoma
- (2) Intradural extramedullary 50%
  - (a) Psammoma } meningioma
  - (b) Endothelioma }
  - (c) Neuro-fibroma From nerve roots
  - (d) Fibro-sarcoma
  - (e) Tuberculoma
- (3) Intradural intramedullary 25%
  - (a) Glioma
  - (b) Tuberculoma
  - (c) Gumma
  - (d) Ependymoma
- (4) Dumb-bell tumours : (Neuro-fibroma)
 

Partly intradural and partly extradural with a narrow neck in between

**Clinic** The cause of clinical signs and symptoms of a spinal tumour is the interference with the functions of the spinal cord and its nerve roots by pressure or involvement.

**Stages** (1) Stage of root involvement

(a) Unilateral

↓ (b) Bilateral

**Clinic** (a) Pain + hyperæsthesia

↓ (b) Anæsthesia

( ) Stage of advancing unilateral pressure :

**Clinic** (a) Root irritation

↓ (b) Motor paralysis

(3) Stage of Brown-Sequard syndrome

**Clinic** (A) Homolateral

(a) Motor loss

(β) Muscular sensation loss

(B) Contralateral

(a) Sensory loss

(β) Loss of pain and temperature sense

(4) Stage of complete transection

Partial → complete bilateral motor and sensory paralysis with trophic changes

- Signs**
- (A) **Vertebral tumours :**
- (1) **Pain** (a) Local  
(b) Referred root pain
  - (2) **Bone involvement**  
(a) Thickening  
or (b) Collapse
  - (3) **Compression paraplegia**  
Rapid upper motor neuron complications
  - (4) **X Rays** (a) New bone  
(b) Rarefaction
- (B) **Intradural extramedullary** (See above)
- (1) Root involvement root pains
  - (2) Unilateral pressure on cord
  - (3) Brown Sequard
  - (4) Complete transection
- (C) **Intradural intramedullary**
- (1) Absence of root pains
  - (2) Progressive transverse lesion  
Lower neuron paralysis with changes
  - (3) Extending upper level

*Special tests*

- (1) **Thecal puncture**
  - (A) **Hydrostatic**
    - (a) **Queckenstedt**  
Bilateral jugular pressure fails to raise spinal C.S.F. pressure
    - (b) **Ayer**  
Difference between C.S.F. pressures
  - (a) Cistern
  - (b) Spine
- (B) **Chemical**  
Froin's syndrome
  - (a) Xanthochromia
  - (b) Increased protein
  - (c) No increase in cells
- (2) **Cistern puncture**
  - (a) **Ayer**
    - (a) Difference between cistern and lumbar pressures
    - (b) Queckenstedt present in cistern but absent in lumbar
    - (c) Oscillations present in cistern but absent in lumbar
  - (b) **Heavy lipoidol injection** 2 c.c.

## (3) Radiological examination

## (a) Plain

(a) Increase in inter pedicular distance

(β) Decrease in pedicular height

(γ) Rarefaction

## (b) Lipoidol Block

Tech (a) 2 c.c. heavy in cistern

(β) 2 c.c. light in lumbar

## (4) Wassermann or Kahn

*Special signs at different spinal levels*

## (A) Upper cervical

(1) Cervical or occipital neuralgia

(2) Phrenic involvement

Irritation or paralysis of diaphragm

(3) Cardiac irregularity

(4) Pupillary changes exophthalmos etc.

(5) Hyper pyrexia

## (B) Lower cervical and upper dorsal

(1) Neuralgia Brachial

Intercostal

Girdle

(2) Paralysis of upper extremity muscles

(3) Reflexes absent triceps

supinator

(4) Pupillary changes

## (C) Lower dorsal

(1) Neuralgia: Abdominal

(2) Paralysis of abdominal parietes

(3) Abdominal reflexes absent

## (D) Lumbar

(1) Sciatica

(2) Paralysis of lower extremity muscles

(3) Reflexes absent cremasteric

knee

(4) Abnormal sphincters Bladder & rectum  
(Incontinence)

## (E) Cauda equina

(1) Neuralgia back, perineum genitals

(2) Sensory loss: Sacral

(3) Paralysis below the knee

(4) Abnormal sphincters Bladder & rectum  
(retention)

## Diff. diag

(1) Transverse myelitis

(2) Disseminated sclerosis

(3) Syringomyelia

(4) Vertebral disease

(5) Gumma.

**Treat Laminectomy and removal**

- Tech (A) One stage  
(B) Two stages

Ind Slowly progressive transverse lesion of the cord where vertebral disease and syphilis can be excluded

**(VI) COMPRESSION OF THE SPINAL CORD:****(1) Vertebral causes**

- (A) Fracture or fracture-dislocation  
(B) Inflammations  
    (a) Acute osteomyelitis  
    (b) Tuberculosis  
(C) New growths  
    (a) Benign      (a) Chondroma  
                      (β) Osteoma  
                      (γ) Myeloma  
                      (δ) Chordoma  
    (b) Malignant    (a) Sarcoma  
                      (β) Secondary carcinoma  
(D) Degenerative affections  
    (a) Osteitis deformans  
    (b) Osteoarthritis

**(2) Meningeal causes**

- (A) Extradural:  
    (a) Traumatic hæmorrhage Thorburn  
    (b) Inflammation Tuberculosis  
    (c) New growth    (a) Lipoma  
                          (β) Hæmangioma  
(B) Intradural  
    (a) Trauma hæmorrhage  
    (b) Inflammations    (a) Pachymeningitis  
                              (β) Serous meningitis  
    (c) New growths    (a) Endothelioma  
                          (β) Hæmangioma

**(3) Medullary causes**

- (A) Trauma hæmatomyelia  
(B) Inflammations  
    (a) Tuberculosis  
    (b) Gumma  
(C) Neoplasms  
    (a) Glioma  
    (b) Ependymoma  
(D) Degenerations Syringomyelia

**(4) Neural causes Neuro-fibroma****(5) Extravertebral causes Aneurysm**

**(VII) ANTERIOR POLIOMYELITIS: -**

**Def** Destructive inflammation of the anterior horn of the spinal grey matter leading to lower motor neuron type of paralysis of the affected segments

**Etiol** (a) Children under 4 years  
(b) Ultra-microscopic virus  
Through upper air passages

**Path** Paralysis of anterior horn motor cells due to  
Oedema, haemorrhage and ischaemia

**Clinic** (1) Stage of invasion  
(a) Febrile attack + *spino sign* (stiff back)  
↓ (b) Widespread lower neuron paralysis  
(a) Below the knee  
(β) Above the elbow  
(γ) Shoulder girdle

(2) Stage of recovery 2 months to 2 years  
(a) Recovery of function  
(b) Reaction of degeneration  
(c) Faradic response

(3) Stationary stage After 2 years  
(a) Residual paralysis with no recovery  
(b) No faradic response  
(c) Muscles affected  
Peronei extensors of toes, feet and legs  
Shoulder girdle biceps and supinators

(4) Stage of deformities  
**Etiol** Neglect of prophylactic supports  
**Time** During the stage of recovery

**Clinic** (1) Talipes equino-varus or valgus  
calcaneo-valgus  
(2) Knee flexion  
(3) Hip abduction-flexion

**Diff. Diag** (A) Upper neuron  
(1) Spastic diplegia  
(2) Spastic paraplegia  
(3) Amyotrophic lateral sclerosis  
(4) Hereditary ataxy

(B) Lower neuron  
(1) Spina bifida  
(2) Peripheral nerve trauma or inflammation  
(3) Neuro-muscular paralysis of tooth  
(4) Syringomyelia

(C) Primary muscular paralysis  
(D) Congenital deformities Talipes  
(E) Fevers

**Diagnosis** (1) Age: Within 4 years  
(2) Capricious and asymmetrical

- (3) Trophic changes  
 (4) Partial auto-recovery within two years
- Treat (A) Stage of acute extensive paralysis
- (1) Painful stage  
 Complete rest in over-correction
    - (a) Upper extremity  
 Abduct. + flex. + supin. + dorsiflex.
    - (b) Lower extremity  
 Extension + neutral position
  - (2) Painless stage Immobilisation
    - In Over-corrected positions
    - By Splints or retentive apparatuses
    - With Gentle massage and passive movements
- (B) Stage of recovery 2 months to 2 years
- (1) Fixation
    - In Relaxation of paralysed muscles
    - By Splints and surgical appliances
  - (2) Maintenance of nutrition  
 Massage, physio-therapy electro-therapy
  - (3) Exercises Voluntary
- (C) Stage of deformity After 2 years
- (1) Division and sliding of soft structures
    - ↓ Gradual or forcible correction of deformities
    - ↓ Fixation in splints or plaster
- Tech (a) Tenotomy  
 (b) Tendon lengthening  
 (c) Division of fasciae and ligaments  
 (d) Sliding of muscles
- Sites (1) Tendo Achilles Bayer Z in equinus  
 (2) Steinle in equino-varus  
 (3) Hamstrings in knee flexion  
 (4) Tensor fasciae femoris & sartorius  
 (5) Souter's iliacus sliding in hip flexion
- (2) Tendon transplantation  
 (See under Tendons)
- Principles (a) Same innervation  
 (b) Non-opposing groups  
 (c) Direct path  
 (d) Previous correction of deformity  
 (e) Fixation to bone
- Ind (1) Paralysed quadriceps :
 

Biceps	} into {	patella
Sartorius		
Iliotibial band		
- (2) Paralysed peronei :
 

Tibialis ant.	} into {	Cobbold Fifth metatarsal



- (3) **Paralysed Achilles**  
 Peronei  
 Long flexors of toes } into { os calcis
- (4) **Paralysed extension of the hand:**  
 Flexor carpi rad.  
 Flexor carpi uln.  
 Palmaris long. } into { Ext. dig. com.  
 Ext. of thumb
- (3) **Tenodesis**  
 Tendo Achilles in heel drop
- (4) **Arthrodesis**  
 Ind (a) Flail or deformed joint  
 (b) After the age of 12
- Sites (1) Shoulder  
 (2) Foot:  
 (a) Naughton Dunn astragular head  
 cuneiform  
 scaphoid  
 (b) Whitman astraglectomy  
 (c) Lamberton subastragaloid + midtarsal
- (3) **Knee**
- (5) **Amputation**  
 Ind (a) Extensive paralysis  
 + (b) Trophic ulceration  
 + (c) Stunted growth
- (6) **Ganglionectomy**  
 Ind Trophic phenomena
- (7) **Bone-graft Hibbs**  
 Ind Flail spine

## (VIII) SPINAL DEFORMITIES:

### (1) SCOLIOSIS

Def Habitual lateral deviation of a part or the whole of the spinal column from the middle line

- Etio (1) **Congenital** Wedge-vertebra  
 (2) **Static:** (a) Adolescent asthenia  
 (b) Abnormal posture habit  
 (c) Excessive fatigue  
 (d) Bad hygiene  
 (3) **Metabolic** (a) Rickets  
 (b) Osteomalacia  
 (c) Hyperparathyroidism  
 (4) **Paralytic** (a) Infantile paralysis  
 (b) Syringomyelia  
 (5) **Compensatory:** Empyema, short limb  
 (6) **Spinal local disease**  
 (7) **Occupational**

Path Factors Etiology + gravity + habit  
 Stages (1) Incipient Auto-correction  
 Simple postural curvature

- (2) **Reducible** Passive correction  
Adaptive changes in soft tissues
- (3) **Irreducible** No correction  
Structural changes in bones
- Morb anat (a) Torsion of the trunk  
              ↓ (b) Lateral inclination } of vertebrae  
              + (c) Rotation

- Clinic (A) **Primary deformity**  
          (a) **Primary curve** C or S shaped  
          ↓ (b) **Compensatory curves**  
              At both ends of (a)
- (B) **Secondary deformity**

Site	Convex side	Concave side
(1) Scapula	Projecting back	Forwards
(2) Chest (a) Front (b) Back	Flat Projecting	Projecting Flat
(3) Ribs	Separated	Crowded
(4) Costo-crietal space	Wide	Narrow
(5) Hip	—	Projecting back

- (C) **Examine the patient :**  
 (a) Standing and bending forwards  
 (b) Sitting  
 (c) Prone  
 (d) In suspension
- Compl (1) Neuralgia  
 (2) Osteoarthritis  
 (3) Lung complications  
 (4) Heart failure
- Treat (A) **First stage**  
       *Obliteration of the curve on flexion*  
 (1) General hygiene and tonics  
 (2) Remedial exercises + adequate rest  
 (3) Postural re-education of muscles
- (B) **Second stage**  
 (a) *Non-obliteration of the curve on flex.*  
 + (b) *No bony changes*  
 (1) **Forcible correction in flexion**  
       ↓ **Plaster jacket in suspension**  
       Ind (a) Children and adolescents  
           + (b) Slight deformity  
           + (c) Failure of gymnastic treatment  
           + (d) Lateral curve > rotation

(2) Wedging jacket } of Hibbs  
 ↓ Spinal fusion

- Ind (a) Progressive curve in a growing child  
 (b) Severe curve with imbalance  
 (c) Deformity with pain and fatigue

(C) Third stage *Bony changes*

Mechanical supports Plaster shell  
 Spinal corsets  
 Taylor brace

(2) KYPHOSIS

Def	Increased dorsal convexity of the spine
Varieties	(1) Congenital Wedge-vertebrae (2) Static Round shoulders (3) Rickets or osteomalacia (4) Local bone disease (a) Tuberculosis (b) Traumatic compression fracture (c) Traumatic spondylitis Kummell (d) Secondary carcinoma (5) General bone disease: Old age changes (a) Spondylosis deformans (b) Spondylitis deformans (c) Osteoarthritis of the spine (6) Occupational (7) Compensatory (8) Scheuermann's disease: (See under Bones also)
Etio	Age 10-13 years Site Lower dorsal History of trauma
Path	(a) Prolapse of nucleus pulposus into the spongiosa of vertebral bodies or (a) Vertebral epiphysitis ↓ (b) Wedge-like vertebra + (c) Irregular intervertebral disc
Clinic	<i>After traumatic kyphosis</i>
Stages	(1) Postural stage auto-correction (2) Soft tissue stage homo-correction (3) Bony stage no correction
Treat	(1) Active and passive exercises ↓ (2) Forcible correction → plaster ↓ (3) Spinal supports

(3) LORDOSIS

Def: Exaggeration of the forward lumbar curve

- Etio (1) Legs Equinus  
 (2) Hips:  
     (a) Flexion-contraction  
     (b) Congenital bilateral dislocation

(3) **Spine**

(a) Spondylolisthesis

(b) Dorsal kyphosis static or pathological

(4) **Abdominal weight** Pregnancy ascitis

Treat (a) Treat the etiology

(b) Spinal supports

**(IX) SCIATIC-SCOLIOSIS SYNDROME:**

Syn + Painful back

Clinic (1) History of injury or inflammation

(2) **Lumbar gluteal and sciatic**

(a) Pain (b) Tenderness, (c) Spasm

(3) Sciatica with inability to raise the straight leg

(4) Scoliosis and lumping

(5) Tender points with positive novocain test

*Etiological classification***(A) MUSCULAR AND FASCIAL LESIONS****(1) Myofascial and ligamentous injuries****(A) Acute****(B) Chronic: postural**(a) **Sacro-spinalis and gluteal strain**

Clinic (a) Sciatic scoliosis

(β) Tender point

Steindler novocain test

Treat (a) **Leriche's repeated novocain injections every third day**

↓ (β) Active exercises

(γ) Bandage-belt jacket

(b) **Fascial contractures following strain**

Clinic (a) Sciatic scoliosis

(β) Abduction contracture of hip

Treat (a) **Spinal manipulations**(β) **Ober's operation**

Ind Painful thigh adduction

Tech Division from iliac crest of

(1) Ilio-tibial band

(2) Fascia lata

(γ) Stripping of post. sup. spine

(c) **Sacro-sciatic and interspinous strain**

Varieties (1) Acute

(2) Chronic

Clinic (a) Sciatic scoliosis

(β) Novocain test

Treat (a) **Leriche's repeated novocain inj.**↓ (β) **Manipulations**(γ) **Excision of spinous processes**

(2) *Myofascial inflammations*

- (a) Traumatic
- (b) Infective
- (c) Specific

## (B) BONE LESIONS

- (a) Traumatic ankylosis
- (b) Traumatic spondylitis Hummel
- (c) Osteoarthritis
- (d) Secondary carcinoma

## (C) JOINT LESIONS

(1) *Spondylitis*

- (a) Traumatic arthritis
- (b) Interarticular arthritis
- (c) Spondylitis deformans
- (d) Infective spondylitis
  - (a) Rheumatoid
  - (b) Osteoarthritis

(2) *Lumbo-sacral affections*

- (a) Lumbo-sacral arthritis : Traumatic
- (b) Sacralisation of 5 L. vertebra :

- Path (a) Skeletal complex  
Unnatural articulation  
(b) Sciatic complex  
Traction on nerve roots

Clinic : Sciatica

Treat : Excision of transverse process

Ind : Presence of both complexes

(c) *Spondylolisthesis*

Def : Forward displacement of 5L vertebral body over the sacrum

Etio Age 11 12 years

Male 70%

(a) *Congenital*

Ill-developed pedicles and laminae

(b) *Traumatic*(c) *Occupational*(d) *Osteoarthritic*

Path (1) Disunion of laminae from centrum

(2) No disunion

(3) Associated deficiency of laminae of 4 and 5L vertebrae in 50% of cases

Clinic (1) Hollow at the sacral top

(a) Lordosis

(b) Sacrum vertical and projecting

(2) Descent of ribs

(3) Lowered stature

(4) Local and referred pain

(5) X Ray :

(a) A.P Convex bow over sacrum

(b) **Lateral**

(a) Antero-posterior thickness of 5L is more than that of 4L.

(β) **Ullman's sign**

Anterior margin of 5L more forward than sacral plane

**Treat** (1) **Rest and supports**(2) **Manipulative reduction**

Ind (a) Within a few months

(β) Before the age of 15

Tech **Anesthesia**

↓ Obliterate the lumbar lordosis

↓ Flex the hips fully + traction

(3) **Operative fusion :**

Tech (a) Preliminary traction

↓ (β) Posterior fusion **Albee****Hibbs**

or (γ) Anterior fusion

After-treat **Plaster with hips in flexion**

↓ Gradual extension of hips

(3) **Sacro-iliac affections**(A) **Trauma**(a) **Sacro-iliac strain**Etio (a) **Acute strain or trauma**(β) **Postural**(γ) **Pregnancy**Clinic (a) **Diminution of lumbar curve**(β) **Pain on compression of the ilia**(γ) **Pain over the joint by flexion of the thigh with knee extended**(δ) **Local tenderness****Treat** (1) **Manipulative**↓ **Strapping**↓ **Diathermy**Tech (a) **Oral sodium amytal 3 grs.**↓ (β) **20-30 c.c.s. of 1% procaine into joint**↓ (γ) **Flexion hip with extended knee**(2) **Retentive apparatus** **Belt**(3) **Arthrodesis**(b) **Sacro-iliac subluxation**(a) **Forward inclination of the sacrum**(β) **Backward inclination of the sacrum**(B) **Infective arthritis**(C) **Tuberculosis**(D) **INTERVERTEBRAL DISC LESIONS**(1) **Trauma** (See under *Spinal Trauma*)(2) **Scheuermann's disease** (See under *kyphosis*)(See under *Bones*)

**(E) STATIC CAUSES**

- (1) Lordosis
- (2) Kyphosis
- (3) Scoliosis

**(F) SECONDARY**

- (1) Abdominal or pelvic disease (*gynaec*)
- (2) Limb deformity
  - (a) Short leg
  - (b) Flat feet

**(G) POST TRAUMATIC SPINAL NEURASTHENIA***Diagnosis of painful back or sciatic scoliosis syndrome***Steindlers procaine test**

**Tech** Local injection of 5-10 c.c. of 1% procaine  
In the painful spot

**Interpretation** Pain is reflex if  
 (a) Puncture aggravates local and referred pain  
 (b) Inj. cures local tenderness and referred pain

**Ind** (a) If positive conservative treatment  
 (b) If negative operative treatment

*Treatment of painful back*

- (1) Treat the etiology
- (2) Conservative
  - (a) Prophylactic: Rest and correction of posture  
Avoidance of strain
  - (b) Acute stage: Rest in bed with hot packs over  
lumbo-dorsal region (Diathermy)
  - (c) Subacute stage: Adhesive elastic strapping  
 With Hips and legs in
    - (a) Abduction
    - + (b) Flexion
    - + (c) Eversion
 Extent: Great trochanter  
 ↓ 4 L. vertebra
  - (d) Chronic stage
    - (1) Manipulations
    - (2) Plaster in lumbar hyperextension
  - (e) Convalescence: Exercises  
Physiotherapy  
Electrotherapy
- (3) Injection treatment (See under Sciatica)  
Endoneural and epidural saline injections
- (4) Operative treatment:
  - (a) Ober's fasciotomy (See above)
  - (b) Spinal fusion: Hibbs
- (5) Spinal supports, belts, corsets jackets etc.

# X) OPERATIONS ON THE SPINE AND CORD:

## (1) LAMINECTOMY

### Indications (1) Trauma

#### (A) *Immediate* (3 days)

##### (a) Compound fracture

With cerebrospinal leak

##### (b) Foreign bodies broken needles

##### (c) Depressed fracture of laminae

##### (d) Impacted dislocation

##### (e) Thorburn's gravitational paraplegia

#### (B) *Intermediate* (3-8 weeks)

After spinal shock has passed

##### (a) Signs of incomplete interruption

(Extension paraplegia) with

##### (a) Progress at standstill

##### (β) Progress delayed

##### (γ) Retrogression of progress

##### (b) Injury to cauda equina

##### (c) Severe and persistent root pains

##### (d) Spinal compression

##### (e) Foreign body near the cord

#### (C) *Late*

*Meningitis serosa circumscripta*

##### (a) Residual symptoms

##### (b) Slow reappearance of symptoms

### (2) Inflammation

#### (A) Acute osteomyelitis of neural arch

#### (B) Pott's disease

##### (a) Laminar disease

##### (b) Intractable root pains

#### (C) Meningitis serosa circumscripta

### (3) Spinal compression by new growths

#### (A) Vertebral

#### (B) Extradural

#### (C) Intradural extramedullary

#### (D) Intramedullary

#### (E) Dumb-bell

### (4) Intractable pain or spasticity

#### (A) Cauda equina or nerve root injuries

#### (B) Ascending neuritis causalgia

#### (C) Pressure on nerve trunks

#### (D) Implication in malignant tumours

#### (E) Painful crises of tabes dorsalis

#### (F) Spastic diplegia



in which spinal reflex arcs are in communication with higher centres.

- (26) Complete transection
  - (a) Paraplegia in flexion complete and non improving
  - (b) Mass reflex
  - (c) Automatic bladder
- (27) Incomplete transection
  - (a) Paraplegia in extension incomplete and improving
  - (b) Absence of mass reflex.
- (28) Retention of full consciousness enables a differential diagnosis of cervical fracture from fracture base of the skull with intracranial compression.
- (29) Every case of severe spinal injury should be submitted without undue delay to X Ray examination.
- (30) In fractures of the vertebral body lateral view is better than antero-posterior
 

Films

  - (a) Immediate lateral
  - (b) Immediate lateral in flexion
  - (c) Delayed lateral after two weeks.
- (31) In cervical injuries, take lateral views with spine fully flexed.
- (32) Injuries of the spinal cord may occur without fractures or dislocations of the spinal column such as
  - (1) Extension quadriplegia  
Immediate short lived paralysis of all limbs
  - (2) Hæmatomyelia  
Loss of pain and temperature senses.
- (33) Most common causes of death in spinal fractures are
  - (a) Urinary complications
  - (b) Lung complications
  - (c) Trophic phenomena with gradual sinking condition.
- (34) Bladder condition in spinal fractures
 

Supra lumbar injuries: automatic bladder

Lumbar injuries active incontinence

Caudal & sacral injuries passive incontinence
- (35) Anatomy of urination with symptoms in trauma
  - (A) 2 L. & 3 L. Sympathetic
 

Function

    - (a) Inhibitory to detrusor
    - (b) Tonic to sphincter

Symp Active incontinence
  - (B) 2 S. & 3 S. Parasympathetic
 

Function

    - (a) Tonic to detrusor
    - (b) Inhibitory to sphincter

Symp Retention.

- (36) Sequelae of spinal trauma
- (1) Chronic backache
  - (2) Spinal neurasthenia
  - (3) Nuclear escape Scheuermann
  - (4) Kummell's disease
  - (5) Osteoarthritis.
- (37) Pain is a frequent and grave complication of cauda equina injuries.
- (38) First-aid workers should be taught that a patient with an injury to the spine must be carried face downwards with hyper-extension of the spine.
- (39) Defer the clinical examination of fracture spine until shock has been treated.
- (40) Morphia in a case of spinal fracture causes abdominal distension and predisposes to ileus.
- (41) Treatment of dorso lumbar flexion fractures  
Reduction by hyper-extension → plaster jacket.
- (42) Vertebral fractures which must not be hyper extended are
- (a) Fract-dislocation with locking of art. processes  
Treat Operative excision of articular processes of upper vertebra and reduction of deformity
  - (b) Hyper-extension lumbo-dorsal fractures
  - (c) Communited fracture with neural canal involvement  
Treat Plaster in upright position with head traction
  - (d) Spondylolisthesis  
Treat (1) Manipulations in flexion  
or (2) Operative fixation  
+ (3) Plaster in hip flexion
- (43) Fracture spine with paraplegia
- Stages
- (1) General shock 48 hours
  - (2) Flaccid paralysis upto 3 weeks
  - (3) Reflex action
- Treat
- (1) Position
    - (a) Turnable bed of Hey Groves
    - (b) Hyper-extending stretcher
    - (s) Prone
  - ↓ (2) Radiography after shock is over
    - (a) Antero-posterior
    - (b) Lateral
  - ↓ (3) Reduction under anaesthesia by
    - (a) Hyper extension
    - + (b) Traction & counter traction
    - + (c) Local manipulations
  - ↓ (4) Plaster cast bed or shell

- + (5) Treatment of complications
  - (a) Chest
  - (b) Urinary
  - (c) Constipation
  - (d) Bed sores
  - (e) Contractures
  - (f) Priapism
- ? (6) Lumbar puncture if necessary
  - (a) Diagnostic
  - (b) Decompression.
- (14) Fractures presenting paralysis should be rectified as soon as possible, whereas in fractures without paralysis it is usual to wait for a few days.
- (45) In spinal injuries with paraplegia, lumbar puncture is valuable in diagnosis and treatment.
- (46) Operation for the treatment of actual cord injury is never necessary as an immediate procedure. From three to eight weeks after the injury is the most suitable period.
- (47) More nearly the symptoms approximate to those of a total interruption of conduction after the spinal shock has passed off the less likely is direct operative treatment of the spinal lesion to be of any real value.
- (48) Operation is useful only in those cases where the lesion is incomplete and shows some power of spontaneous improvement.
- (49) No operation for spinal injury
  - (a) Within first three weeks
  - (b) Complete transection of the cord.
- (50) If it is impossible to bring about reduction of a spinal fracture by hyper-extension it signifies that there is locking of the articular processes, which requires open resection before the application of a plaster cast.
- (51) Time for laminectomy in spinal injuries
  - (1) Immediate
    - (a) Compound fracture
    - (b) Leakage of c. s. f.
    - (c) Foreign bodies
  - (2) Early (2 days)
    - (a) Fracture of the arch with projection into the spinal canal
    - (b) Dislocation with locking articular processes
  - (3) Late (3-8 weeks)
    - Incomplete lesion with no tendency to improve.
- (52) Repair of spinal fractures is rapid and consolidation is sufficient for weight bearing in about 8 weeks but the plaster jacket should be left on for 3-6 months.

- (53) (A) Fractures without paralysis  
Complete plaster cast
- (B) Fractures with partial paralysis  
Complete plaster cast
- (C) Fractures with complete paralysis
  - (a) Plaster shell
  - + (b) Continuous traction by tibial tubercle pins
  - + (c) Braun's splint.
- (54) Extent of plaster jacket
  - (1) Cervical spine
    - (a) Upper head, neck and chest
    - (b) Lower neck and chest  
(occiput behind to chin in front)
  - (2) Dorsal and lumbar spines
    - (a) Front upper end of the sternum and clavicles to the symphysis pubis and Poupart
    - (b) Back highest dorsal vertebra to sacrum
    - (c) Lateral axillae to great trochanters
    - (d) Window over the chest and abdomen.
- (55) Complications of plaster jacket for spinal injuries
  - (1) Respiratory embarrassment
  - (2) Acute dilatation of the stomach
  - (3) Plaster sores.
- (56) In spinal fractures without paraplegia, start active exercises immediately
  - (1) Arms
  - (2) Knees
  - (3) Hips
  - (4) Back
  - (5) Balancing weights.

### (C) Inflammations

- (57) Kummell's disease consists of development of painful back with wedge-shaped deformity of a vertebra, following definite spinal trauma is due to post-traumatic hyperemic osteoporosis and should be treated either by plaster in hyper-extension or bone-graft fixation.
- (58) Treatment of Pott's disease is to produce bony ankylosis with the least possible deformity
- (59) Always evacuate a cold abscess before taking an X Ray picture for caries spine.
- (60) Endosteal T. B. with angular curve children  
Periosteal T. B. with gradual curve adults.
- (61) Paraplegia is seldom the result of gross spinal deformity. It almost always results from the pressure of inflammatory products upon the cord.

- (62) Treatment of Pott's paraplegia is always conservative
- (63) Bone-grafting on T B spine does not lessen the period of convalescence and is contraindicated in children.
- (64) Fusion operations of the spine should only be done in the late stages of the disease after all the spread has ceased and then only in specially selected cases. It should never be done in children and in early or progressive stages of the disease.
- (65) Bone-graft operations done on early cases of T B spine prevent the natural collapse of a vertebra by which normal recovery takes place.
- (66) The whole conservative course of the treatment of Pott's disease should not be less than two years from the start and the whole course should be followed by periodic X Ray examinations.

#### (D) Tumours

- (67) Tumours of the spinal canal
  - (1) Extradural 25% Bony
  - (2) Intradural extramedullary 50%  
Endothelioma or neuro-fibroma  
Root pains prominent
  - (3) Intramedullary 25%  
Glioma  
Absence of root pains
  - (4) Dumb-bell extra and intra dural.
- (68) Spinal tumours are most common in thoracic region  
Most common spinal tumour is extramedullary  
Most common position is posterior or postero-lateral to the sensory roots.
- (69) Upper level of sensory impairment provides the most important evidence of the level of spinal tumours
- (70) Root pains occur most characteristically with the mobile tumour of the posterior root (neuro-fibroma) The pain comes on movements or straining
- (71) Signs of Pott's disease in old age ? secondary carcinoma.
- (72) Caudal lesions
  - (a) Pain diagnosed as sciatica is the earliest and most common symptom of caudal lesions
  - (b) Lipoidol is very useful in caudal lesions
  - (c) Post-operative prognosis of caudal tumour is excellent.
- (73) Lipoidol (.54c. gms. of iodine to 1 c.c. of poppy oil) is only to be used to determine the exact location of a spinal tumour prior to its removal rather than for the diagnosis, as it causes root pains and thecal inflammation unless removed.

- (74) Whereas larger proportion of cerebral tumours are non-encapsuled and therefore irremovable, the converse holds good in the case of spinal tumours.
- (75) Excluding malignant disease of the bone 50% of spinal tumours are suitable for surgical measures.
- (76) The effects of compression by a spinal tumour are entirely removed by its removal even after a considerable time.
- (77) Remember dumb-bell tumours otherwise intra-dural part will be left behind to continue the pressure effects after operation.
- (78) Intense antisyphilitic treatment should precede operative intervention in cases where Wassermann is positive.

#### (E) Anterior poliomyelitis

- (79) Most common cause of paralysis wasting or deformity in a child is anterior poliomyelitis

Stages	(1)	Invasion	<div style="display: inline-block; vertical-align: middle;"> <div style="font-size: 2em; vertical-align: middle;">{</div> <div style="display: inline-block; vertical-align: middle; padding-left: 5px;"> Tendons Fasciae Muscles </div> </div>
	(2)	Recovery	
	(3)	Stationary	
	(4)	Deformities	
Treat	(1)	Physiotherapy	
	(2)	Retentive apparatus Splints, plasters, appliances	
	(3)	Soft structure operations	
	(4)	Bony arthrodesis	
	(5)	Amputations.	

- (80) Wasting of a limb or talipes in a child  
? Ant. poliomyelitis or spina bifida occulta

#### (F) Deformities of spine

- (81) Stages of spinal deformities with treatment
- (1) Auto-correction : static exercises
  - (2) Homo-correction soft tissue changes plasters
  - (3) No correction bony changes appliances.
- (82) Most common causes of scoliosis
- (a) Static
  - (b) Compensatory
  - (c) Paralytic.
- (83) Scoliosis clinical picture & treatment types
- Posterior prominence of costal angles with opposite hip
- Treatment types
- (1) Postural remedial exercises
  - (2) Structural
    - (a) Gymnastics
    - (b) Brace or corset
- Ind. paralytic deformity

(c) Passive stretching and plaster

(d) Hibbs fixation

Ind (a) Progressive deformity & pain

(β) Paralytic cases not controlled by brace.

(84) Most common causes of kyphosis

(a) Static

(b) Tuberculosis.

(c) Rickets and osteomalacia

(85) Angular spinal deformity

(a) Pott's disease

(b) Compression fracture

(c) Kummell's disease

(d) Disc prolapse Scheuermann

(e) Secondary carcinoma

(f) Wedge vertebra

### (G) Painful back

(86) Chief causes of low backache

(1) Mal positions of uterus

(2) Bony lesions

(3) Joint lesions

(4) Intervertebral disc lesions

(5) Muscular and ligamentous lesions.

(87) Treatment of backache

(1) Correction of posture

(2) Rest in bed with heat and counter irritants

(3) Manipulations under anaesthesia

(4) Elastic strapping

(5) Plaster of Paris in hyper-extension

(6) Endoneural and epidural injections

(7) Operations (a) Fasciotomy of Ober  
(b) Spinal fusion of Hibbs.

(88) Faulty posture is the primary cause of most cases of chronic backache and sciatica.

(89) Intervertebral foramen between 5L and 1S is the smallest of the series, but it has to transmit one of the biggest nerves. Any asymmetry of the lumbar articular processes or other anomalies of the 5L may cause pressure or inflammation of the nerve root.

(90) Anomalies of 5L

(a) Sacralisation

(b) Spina bifida

(c) Spondylolisthesis (α) Anterior  
(β) Posterior

(91) Sacro-iliac joints should be radiographed in every case of fibrositis in a young adult male with a history of recurring attacks.

## (H) Laminectomy

- (92) Main indication of laminectomy is relief of pressure from
- (a) Trauma
  - (b) Inflammation
  - (c) Tumour
- (93) Always remember that the spinal segment is at a higher level than the corresponding vertebra.
- (94) In laminectomy for excision of the spinal cord, the lowest lamina to be removed at the level of the highest root involved.
- (95) In posterior rhizotomy for pain or spastic paralysis: Save (1) 7C and 2D or (2) 6C and 1D and (3) 4L.
- (96) Causalgic pains in early stages are cured by alcohol high up in the peripheral sensory root.
- (97) In root lesions, Forster operation is better.
- (98) In Spiller's antero-lateral tract division, divide on the side of the body opposite to which the lesion is situated between the dentate ligament and the nerve-roots origin and never go deeper than the middle of the nerve-roots origin to avoid permanent paralysis of the lower limbs on the same side due to injury to the pyramidal tract.
- (99) Except in the cervical region simple laminectomy is not followed by any weakness of the spinal cord.
- (100) Lumbar puncture is dangerous in high intracranial tension.
- (101) Take great care that the patient does not give a jerk with the lumbar puncture needle in the spinal fluid.
- (102) Places for c. s. f. puncture
- (a) Lumbar between 3L and 4L vert.
  - (b) Cistern midline, above the axial spine
  - (c) Ventricular 3 cms. above and behind external occipital protuberance.



## CHAPTER III

# SYMPATHETIC NERVOUS SYSTEM

### (I) ANATOMY :

(See pages 857 & 859 for Tables)

### (II) PHYSIOLOGY :

#### (1) Sympathetic nervous system

Functions Emotional and physiological emergencies

##### (A) Circulatory

- (a) Heart acceleration
- (b) Vaso-constriction
- (c) Rise in blood pressure

##### (B) Oxygenation

- (a) Inhibition of bronchioles : (dilators)
- (b) Contraction of spleen

##### (C) Secretory

- (a) Adrenal stimulant
- (b) Thyroid stimulant
- (c) Liver stimulant

##### (D) Other :

- (a) Exophthalmos and dilatation of pupil
- (b) Pilomotor
- (c) Sweat secretory
- (d) Muscle tonus

##### (E) Visceral Inhibition

- (a) Inhibition of intestinal peristalsis
- (b) Inhibition of micturition
  - (a) Inhibition of detrusor
  - (β) Spasm of sphincter

#### (2) Parasympathetic nervous system :

Function Body conservation

- (a) Digestion
- (b) Absorption
- (c) Excretion

##### (A) Vasoconstrictor mechanism

Vasoconstrictors of the bloodvessels of the limb are supplied by sympathetic fibres which leave the main somatic nerves at various levels and join the tunica adventitia at intervals throughout the entire length of the vessels

- (a) Sympathetic impulses
- ↓ (b) Histamine reaction
- ↓ (c) Capillary vasoconstriction

[Contd. on p. 859]

## Sympathetic chain

Connector	Pre-ganglion	Ganglion	Post ganglion	Final distribution	Functions
Thoracic 1st and 2nd	Cervical sympathetic	Sup. cervical		(a) Eye (b) Blood-vessels (c) Salivary glands (d) Sweat glands	Dilator Constrictor Secretory
Thoracic 2nd, 3rd and 4th	White rami	(a) Stellate (b) Inf. cervical		(a) Heart (b) Respiratory tract	Accelerator Inhibitory
Thoracic : 4th to 10th	White rami	Stellate	Along blood-vessels	Upper extremity	(a) Vasoconstrictor (b) Sweat (c) Pilo-motor (d) Muscle tone
Thoracic : 5th to 12th	(a) Major splanchnic (b) Minor splanchnic (Through dorsal symp. ganglia)	(a) Celiac (b) Sup. mesenteric	Along blood-vessels to	(a) Diaphragm (b) Proximal colon (c) Liver (d) Pancreas (e) Adrenals, kidneys	(a) Vasoconstrictor (b) Motor to sphincters (c) Peristaltic inhibitor
Lumbar 1st to 3rd	White rami (Through lumbar symp. ganglia)	Inf. mesenteric	Through (a) Hypogastric plex. (b) Pelvic plex. Pre-sacral nerve	(a) Distal colon and rectum (b) Bladder & ureters (c) Sexual organs	(a) Peristaltic inhibitor (b) Motor to sphincters
Thoracic 10-12 Lumbar 1-3	White rami	Lumbar 2 3 4	Along blood-vessels	Lower extremity	Vasoconstrictor

Connector	Pre-ganglion	Ganglion	Post ganglion	Functions
(A) Cerebral parasympathetic: (1) Mid brain	Oculomotor	Ciliary	Pupil	Contraction
(2) Medulla	(A) Facial	(a) Spheno-palatine (b) Submaxillary	(a) Lacrymal glands (b) Nasal & palatal glands (c) Submaxillary glands (d) Sublingual glands	Secretory
	(B) Glossopharyngeal	Otic	(a) Mouth (b) Parotid	Secretory
	(C) Vagus	(a) Heart (b) Larynx, trachea, bronchi (c) Oesophagus to proximal colon (d) Liver and pancreas		Inhibitory (a) Motor to peristalsis (b) Inhibitory to sphincters (c) Secretory
(B) Sacral parasympathetic Sacral: 2nd 3rd 4th	Pelvic splanchnic	Pelvic plexuses	(a) Distal half of colon and rectum (b) Ureters & bladder (c) Sexual organs and external genitalia (Nervi erigentes)	(a) Motor to peristalsis (b) Inhibitory to sphincters Excitor

**(B) Skeletal muscles**

Control of muscle fatigue

**(C) Intestinal musculature****(1) Motor**

- |                      |                            |
|----------------------|----------------------------|
| (a) Internal control | (α) Auerbach               |
|                      | (β) Meissner               |
| (b) External control | (α) Sympathetic Inhibition |
|                      | (β) Parasympathetic Motor  |

**(2) Sensory**

The only adequate stimulus to cause sensation in hollow viscera, is tension.

- |                        |                 |
|------------------------|-----------------|
| (a) Pain               |                 |
| (b) Hyperalgesia       | (α) Superficial |
|                        | (β) Deep        |
| (c) Muscle spasm       |                 |
| (d) Glandular activity |                 |

are all referred to parietal segmental associates

**(D) Relation to endocrine system****(1) Thyroid** sensor of sympathetic system**(2) Adrenal medulla**

- |  |
|--|
| (a) Brain-stem control centre          |
| ↓ (b) Splanchnic nerves                |
| ↓ (c) Connector fibres                 |
| ↓ (d) Excitor cells in medulla         |
| ↓ (e) Adrenaline                       |
| ↓ (f) Absorption into the blood        |
| ↓ (g) Action on the junctional tissues |
| ↓ (h) Sympathetico-mimetic action      |

**(E) Chemical products in sympathetic and para-symp**

- |                    |                                  |
|--------------------|----------------------------------|
| (1) Thyroxin       | From thyroid                     |
| (2) Adrenalin      | From adrenals                    |
| (3) Sympathin      | From sympathetic nerve terminals |
| (4) Acetyl choline | From parasympathetic terminals   |

**(III) DISEASES AMENABLE TO SYMPATHECTOMY****(1) BLOOD VESSELS****(A) *Extremities***

- |                                   |
|-----------------------------------|
| (1) Raynaud                       |
| (2) Thrombo-angiitis obliterans   |
| (3) Vasomotor neuroses            |
| (a) Upper limb                    |
| (α) Acrocyanosis                  |
| (b) Pneumatic hammer disease      |
| (c) Scleroderma and sclerodactyly |

- (d) Cervical rib
    - (e) Crutch pressure
  - (β) Lower limb
    - (a) Erythromelalgia
    - (b) Erythrocyanosis crurum
  - (1) Heterogenous group :  
(Betterment of vascularity)
    - (a) Chronic ulcers
    - (b) Gangrene
    - (c) Poliomyelitis
    - (d) Chronic arthritis
    - (e) Traumatic osteoporosis
    - (f) Arterial obliterations
    - (g) Volkmann's contracture
- (D) *Head*
  - (1) Eye Retinitis pigmentosa
  - (2) Ear
    - (a) Meniere's disease
    - (b) Deafness
    - (c) Vertigo
  - (3) Cerebral lesions :
    - (a) Epilepsy
    - (b) Mental deficiency
    - (c) Post-encephalitic states
    - (d) Cerebral paralysis
  - (4) Migraine and chronic headaches
- (C) *Thorax* Angina pectoris
- (II) SWEAT GLANDS Hyperidrosis
- (III) THE VISCERA
  - (A) *Alimentary canal*
    - (1) Oesophagus Cardiospasm
    - (2) Stomach Peptic ulcer
    - (3) Colon
      - (a) Hirschsprung
      - (b) Obstinate constipation
  - (B) *Urinary tract*
    - (1) Kidney renal sympathetico-tonus
    - (2) Bladder cord bladder
  - (C) *Thorax* Asthma
- (IV) AFFERENT NERVE PATHWAYS
  - (A) Head neuralgias
  - (B) Viscera Inoperable neoplasms
  - (C) Extremities
    - (a) Causalgia
    - (b) Painful stumps
    - (c) Painful ulcers
    - (d) Painful gangrene

## (V) GYNÆCOLOGICAL DISEASES

- (1) **Dysmenorrhœa**
- (2) Menorrhagia
- (3) **Dyspareunia**
- (4) Pelvic neuralgia
- (5) **Inoperable carcinomata**
- (6) Vaginismus
- (7) **Itchiness vulvæ**
- (8) Sexual neuroses

## (VI) KINETIC SYSTEM

- (1) Neuro-circulatory asthenia
- (2) Essential hypertension
- (3) Hyper thyroidism
- (4) Diabetes associated with hyper thyroidism
- (5) Epilepsy
- (6) Peptic ulcer

## (I) SYMPATHETIC BLOOD VESSEL DISEASES

## (A) EXTREMITIES

- (1) RAYNAUD (See under Blood vessels).

*Indications for sympathectomy*

- Before
- (a) Scleroderma
  - (b) Ulceration
  - (c) Absorption of phalanges

*Treatment grades of Raynaud's disease*

- (a) **Raynaud's phenomenon**  
Cyanosis on exposure  
Sympathectomy unnecessary
- (b) **Raynaud's disease**
  - (α) **Colour stage**
    - (1) Slate colour with numbness
    - ↓ (2) Bright red colour with burning

Sympathectomy good
  - (β) **Ulcerative stage**  
Sympathectomy a chance
  - (γ) **Sclerodermic stage**  
Sympathectomy useless

**Treat Sympathectomy**

- (A) *Upper extremity*
  - (1) Cervico-thoracic + 2nd thoracic ganglionectomy
  - (2) Resection of 2-3 of sympathetic trunk below stellate ganglion, which is preserved.

(B) *Lower extremity*

2nd+3rd+4th lumbar ganglionectomy

(2) **THROMBO ANGIITIS OBLITERANS**  
**BUERGER'S DISEASE**

(See under Blood vessels)

(A) **Proximal type Calf**

Path **Proximal arterial affection**

Clinic (a) Intermittent claudication of calf muscles  
(b) Cold extremities  
(c) Postural colour changes  
(d) Absence of main arterial pulse  
(Popliteal)

Treat **Amputation**  
(Sympathectomy no good)

(B) **Distal type Toes**

Path **Peripheral vessel affection**

Clinic (a) Coldness and numbness of toes  
(b) Severe pain in toes and foot at rest  
(c) Ulceration and gangrene of toes  
(d) Presence of main arterial pulse  
(Popliteal)

Treat **Sympathectomy Lumbar ganglionectomy**  
Ind (a) Distal type  
(b) Early cases with not much of sclerosis  
(c) Mild trophic changes

(3) **VASOMOTOR NEUROSES**

(a) **Acrocyanosis**

Etiol Young women cold season

Clinic Cyanotic swelling and chilblains of fingers  
hand and forearm

Treat Stellate ganglionectomy

(b) **Pneumatic hammer disease:**

Raynaud's disease in labourers using pneu-  
matic drill

(c) **Scleroderma and sclerodactyly**

Treat Cervico-thoracic or stellate ganglionectomy

(d) **Cervical rib**

Path Raynaud syndrome due to pressure on the  
lower trunk of brachial plexus

(e) **Erythromelalgia:**

Def Hyperæmic stage of Raynaud's disease

Site Foot

Etiol Men

Clinic Hot, red swollen sole with burning pain

(f) **Erythrocyanosis crurum or frigida**

Syn Bazin's disease (See page 22)

- Etio Fat legs of adolescent women, esp. jewesses  
 Path Of chilblain  
 Clinic Cold legs and ankles with  
     (a) Blue swollen indurated patches  
     ↓ (b) Shallow ulcers  
 Treat (1) Blotchy skin sympathectomy good  
       (2) Thick ankles sympathectomy no good

#### (4) HETEROGENOUS GROUP

##### (Betterment of vascularity)

##### (a) Chronic or trophic ulcers

- Treat Periarterial sympathectomy  
   Ind Temporary betterment of circulation  
   ↓ Healing

##### (b) Gangrene

##### Varieties (1) Arterio-sclerotic

- Treat Periarterial sympathectomy  
   Ind (a) Preliminary to amputation  
       (b) Promotion of separation and healing

##### (2) Diabetic

- (a) Non-healing chronic ulcers  
     (b) Gangrene  
 Treat Periarterial sympathectomy  
   Ind (a) Preliminary to amputation  
       (b) Promotion of separation and healing

##### (c) Anterior poliomyelitis

- Treat Appropriate ganglionectomy  
   Ind Wasted cold blue limb with trophic ulcers and chilblain (Not severe)

##### (d) Chronic arthritis

##### Rheumatoid osteoarthritis

- Treat Upper or lower ganglionectomy  
   Ind (a) Absence of primary septic focus  
       (b) Failure of conservatism  
       (c) Response to sympathetic tests  
       (d) Only periarthritic & synovial changes  
       (e) Small joints

Contraind Large joints with bony changes

- Results (a) Better circulation  
       ↓ (b) Absorption of calcification

##### (e) Traumatic osteoporosis

Etio Crushing injuries

Sites Hand or foot

Clinic (a) Oedema, cyanosis and coldness



- (b) Rarefied bones
- (c) Arthritis
- Treat Appropriate ganglionectomy
- (f) Arterial obliterations
- Clinic (1) Signs of stopped circulation
- (2) Signs of sympathetic stimulation
  - (a) Vasospasm
  - (b) Cyanosis
  - (c) Pain and trophic changes
- Treat Resection of obliterated part of the artery  
(Indirect periarterial sympathectomy)
- (g) Volkmann's contracture  
(See under Muscles)
- Treat (a) Periarterial sympathectomy  
(Brachial art.)
- or (b) Resection of thrombosed part of brachial  
Ind Within 48 hours of onset

**(B) HEAD**

- (a) Retinitis pigmentosa
  - Def Pigmentary degeneration of retina  
Due to vasospasm of retinal vessels
  - Path Vaso-constriction
    - ↓ Deficient blood supply
    - ↓ Retinal degeneration peripheral → central
  - Clinic (a) Night blindness
    - ↓ (b) Contraction of visual field
    - ↓ (c) Loss of visual acuity
    - ↓ (d) Total blindness
- (b) Ear: Deafness Meniere's disease vertigo
- Treat Stellatectomy
- (c) Migrain and chronic headaches
- Treat Stellatectomy
- (f) Cerebral lesions:
  - (α) Spastic quadriplegia
  - (β) Post-encephalitis syndrome
  - (γ) Congenital mental deficiency
  - (δ) Epilepsy
- Treat (1) Bilateral cervico-dorsal ganglionectomy
- (2) Division of thoracic chain between 1st and 2nd

**(C) THORAX Angina pectoris**

- Etio Educated classes
- Path (a) Coronary vasospasm
  - ↓ (b) Ischaemia
  - ↓ (c) Degeneration and fibrosis of vessel walls
  - ↓ (d) Myocardial degeneration

- Treat (1) Radical stellatectomy  
 Ind (a) No valvular disease  
      (b) No myocardial degeneration  
 (2) Paravertebral alcohol injection  
      (See under Operations)  
 Ind Seniles with sclerotic cardiovascular syst.  
 Compl Intercostal neuritis  
 (3) Total thyroidectomy

## (II) SYMPATHETIC SWEAT GLAND DISEASES

### HYPERIDROSIS

Clinic Moist, clammy hands with dripping sweat

Treat Excision of the stellate ganglion

## (II) SYMPATHETIC DISEASES OF THE VISCERA

### (A) ALIMENTARY TRACT

- (1) Oesophagus Cardiospasm  
      (See under Oesophagus)

Def Hypertrophy atony and dilatation of the oesophagus with spasm of the cardiac sphincter

- Path (a) Sympathetic irritation  
      ↓ (b) Spasm of the sphincter  
      + (c) Inhibition of oesophageal peristalsis  
      ↓ (d) Oesophagitis  
      ↓ (e) Fibrosis of the cardia  
      + (f) Oesophageal atony

Treat (1) Dilatation Hurst or gum-elastic bougies

- (2) Gastrostomy

↓ Digital dilatation or plastic operation

Ind Organic stenosis

- (3) Left gastric periarterial sympathectomy

Ind Neuromuscular disturbance

Tech Excision of left gastric artery from its origin to its termination on the oesophagus and of its gastric branches.

- (2) Stomach Peptic ulcer

Treat (1) Removal of or alcohol injection into Celiac plexus

+ (2) Jejunostomy

- (3) Colon

(a) Hirschsprung's megacolon (See under Colon)

Def Dilatation and hypertrophy of the colon with retention of its contents due to spastic recto-sigmoid sphincter

Etio Childhood (a) 25% before 5 years  
                      (b) 50% before 20 years

**Males: Females 3 1**  
**Familial**

- Path** (a) Disturbed balance between sympathetico-parasympathetic nervous control of recto-sigmoid sphincter  
 ↓ (b) Sympathetic hyperaction  
 ↓ (c) Inhibition of colic peristalsis  
 + (d) Spastic recto-sigmoid sphincter  
 ↓ (e) Hypertrophy and dilatation of colon  
 + (f) Obstinate constipation
- Clinic** (1) Bad constipation + *spurious diarrhoea*  
 (2) Severe abdominal distension  
 (3) Auto-intoxication  
 (4) X Ray Barium meal and enema  
     (a) Enormous dilatation  
     (b) Absence of peristalsis  
     (c) Absence of haustra  
     (d) Stasis  
     (e) Evacuation after spinal
- Treat** Sympathectomy  
     Ind (a) Age before 5 or 6 years  
         (b) Positive preoperative test  
             Barium enema  
             + Spinal anaesthesia  
             ↓ Peristalsis and evacuation
- Operations** (1) Bilateral division of lumbar splanchnics (Telford and Stopford)  
 (2) Perivascular inferior mesenteric sympathectomy (around the origin of inf mesent. artery)
- Compl** Recurrence due to  
     (a) Inadequate removal  
     (β) Injury to parasympathetic  
     (γ) Intramural fibrosis
- (b) Chronic constipation and diverticulitis:
- Treat** (1) Re-education of bowels:  
     Diet aperients, exercises, lavages  
 ↓ (2) Stimulation of parasympathetic  
     Course of acetylcholine + prostigmine  
 ↓ (3) Sympathectomy  
     Ind Positive preoperative tests  
     (A) (a) Barium meal  
         With 24 hourly observation

- ↓ (b) Spinal anaesthesia  
After stasis of 7 days  
or (c) Spinal anaesthesia  
When head of contents reaches  
recto-sigmoid sphincter

**(B) Barium enema**

- ↓ Immediate spinal anaesthesia  
(Operations as in Hirschsprung)

**(B) URINARY TRACT**

**(1) Renal sympathetico-tonus**

**Def** Obstructive nephropathy due to deficient emptying of the pelvis caused by neuromuscular dysfunction in the form of sympathetic hyperfunction

**Etio** Nervous stress

**Path** (a) Sympathetic Hyperfunction

↓ (b) Spasm of outlet ring muscles of calyces and pelvi-ureteral sphincter

↓ (c) Hydronephrosis

**Clinic** (1) Unilateral renal pain  
Relieved by hypodermic eserine  
(2) Tender costo-vertebral angle  
(3) Renal tumour  
(4) Urine and renal functions normal

**Spl. signs** (1) Response to hypodermic eserine 1/100 gr  
(2) Pyelography

**Stages** (1) Stage of hyper irritation  
(a) Irregular contractions  
(b) Delayed emptying  
(c) Colicky pains  
(d) Eserine response positive

(2) Stage of exhaustion  
(a) Diastole  
(b) No emptying  
(c) Constant pain  
(d) Eserine response positive

(3) Stage of paralysis  
Hydronephrosis

**Compl** Urinary sepsis

**Treat** Renal sympathectomy

**Tech** (1) Extra-peritoneal exposure of kidney  
(2) Isolation of pedicle  
(3) Eserine test If positive  
(4) Paint the pedicle with 10% carbolic  
(5) Adventitiectomy of  
(a) Pedicle vessels (take care of vein)

(b) Uretero-pelvic junction

(c) First inch of ureter

Post compl Severe lumbar pain

(2) **Hydro-ureter**

Treat Presacral neurectomy

(3) **Bladder Cord bladder**

Def Retention of urine with or without overflow

Treat Presacral neurectomy: (Sympathectomy)

Result Unopposed nervi erigents (parasympathetic)

↓ Evacuation of bladder

(C) **THORAX****Asthma**

Treat (1) Excision or alcoholic injection of mid-dorsal sympathetic ganglia supplying the pulmonary plexuses

(2) *Resection of vagi*(IV) **SYMPATHETIC AFFERENT NERVE PATHWAYS**(A) **HEAD****Trigeminal neuralgia:**

Treat Excision of stellate ganglion

Ind Failure of (a) Alcohol injection  
(b) Sensory root excision(B) **VISCERAL INOPERABLE NEOPLASM PAINS****Pelvic**

Treat Presacral neurectomy upto origin of inf mes. art.

(C) **EXTREMITIES**(1) **Causalgia**

Path Sympathetic dysfunction

Clinic Painful extremity with hot, burning spasmodic pain in hand or sole with serious, trivial or no apparent primary cause

Treat (1) **Periarterial sympathectomy**(2) **Excision of sympathetic ganglia:**

Ind Disappearance of pain by novocain injection into main nerves or symp. ganglia

(2) **Painful stumps**

Varieties (1) Normal sensations of the amputated limb

(2) **Pathological sensations**(A) **Pain in phantom limb**

Treat (a) Excision of false neuroma

(b) Section of the nerve

(B) **Sympathetic syndrome**

Clinic Pain + vasospasm + trophic

Treat (1) **Periarterial sympathectomy:**  
: In upper limb(2) **Ganglionectomy**

In lower limb

**(C) Extreme hyperæsthesia of stump**  
 Path Ascending neuritis

**(V) GYNÆCOLOGICAL SYMPATHECTOMIES**

Ind (See above)

- Treat (1) Presacral neurectomy  
 (2) Periaxillary sympathectomy

**(VI) KINETIC SYSTEM**

Def Tissues associated with the control of energy exchanges

- (a) Sympathetic system  
 (b) Adrenals  
 (c) Thyroid

**(1) Neuro-circulatory asthenia**

Def Sympathetic hyper irritability

Not due to hyperthyroidism or psychic causes

- Clinic (1) Nervousness  
 (2) Debility  
 (3) Tachycardia heart consciousness

- Tests (1) Viscero-ocular reflex  
 Dilatation of pupils on epigastric pressure  
 (2) Somogyi reflex  
 Dilatation of pupils on deep inspiration  
 (3) Erben's reflex  
 Bradycardia on flexure of thighs and trunk

Treat Adrenal denervation

**(2) Essential hypertension**

Def Abnormally high blood pressure rising to high peaks under excitement and physical strain

Etio Young adults → 4th decade

Path Neurogenic endocrine vascular disturbance  
 ? Basophilism

- Clinic (1) Headaches On mental exertions and fatigue  
 (2) Insomnia, irritability  
 (3) High blood pressure

Clinic types Of Keith

(A) Benign:

Age 40-45

Course 10-15 years

- Clinic (a) Intermittent headaches  
 (b) Retinal arterial spasm

(B) Early malignant

Course 3-4 years

- Clinic (a) B. P 160-200  
 (b) Retinal

Spasm + hæmorrhage + inflammation

## (C) Malignant :

Course 18 months

Clinic (a) B. P 160-300

(b) Severe retinal changes

(c) Cardio-vascular changes

(d) Renal changes

Compl (1) Cardio-vascular

(2) Renal

(3) Arterio-sclerosis

Treat (1) Adrenal denervation

(2) Adson Division of major and minor splanchnics

+ Excision of 1st and 2nd lumbar ganglia

+ Excision of outer 2/5th of suprarenal

Ind (a) Recent disease in young people

(b) No retinal changes

(c) No renal or cardio-vascular changes

(d) Rest and vaso-dilators effective

(e) Positive tests

(a) Exaggerated cold stimulus response

Rise in B. P

(b) Spinal anaesthesia response

Fall in B. P

Contraind (a) Complications

(b) General unsuitability

Routes (a) supra-diaphragmatic (Peet)

(b) Sub-diaphragmatic (Adson)

## (3) Hyperthyroidism

Treat (1) Thyroidectomy

(2) Adrenal denervation

Ind (a) Recurrent hyperthyroidism

(b) Residual hyperthyroidism

After thyroidectomy

## (4) Diabetes :

(A) Associated with hyper-thyroidism

Treat (1) Thyroidectomy 55% of cures

(2) Adrenal denervation rest of the cures

(B) Diabetes mellitus :

Adrenal operation not indicated

(5) Epilepsy : 30% benefits by adrenal denervation

(6) Peptic ulcer : ? Adrenal denervation

## (IV) INDICATIONS FOR SYMPATHECTOMY :

## (1) VASO SPASTIC CIRCULATORY DISEASES

Spasm &gt; Sclerosis

Indicative tests

## (A) POSTURAL TESTS

(1) Ordinary postural test :

(a) Normal good colour at 180° elevation

- (b) Occlusion pallor at 135 elevation
  - (c) Bad occlusion pallor at 70 elevation
  - (2) Buerger's postural test
    - Angle of circulatory efficiency
    - (a) Leg raised from  $40^{\circ}$  to  $90^{\circ}$  ischaemia
    - (b) Leg lowered  $65^{\circ}$  —  $90^{\circ}$  rubor
    - (c) Angle of circulatory efficiency
      - (a) Raise the leg to vertical till pallor is stationary
      - (b) Lower the leg gradually
      - (c) Note the angle at which normal pink colour returns
- (Angle of circulatory efficiency is  $30^{\circ}$  below the horizontal in Buerger's disease)

## (B) THERMAL TESTS

### (1) Protein shock

Intravenous injection of 50-70 millions of dead typhoid bacilli (T.A.B. vaccine)

### (2) Sympathetic block

#### Tech (A) Peripheral nerve block

Intra-neural injection into a peripheral nerve of 5 c.c. of 2% novocain

#### (B) Spinal anaesthesia

#### (C) Paravertebral novocain block

##### (a) Upper extremity

Thoracic 4-10

↓ Thoracic sympathetic

↓ Thoracic ganglia 1-2

↓ Brachial plexus

##### (b) Lower extremity

Thoracic 8-12 + Lumbar 1-2

↓ Lumbar chain

↓ Lumbar ganglia

↓ Lumbar + sacral plexuses

#### (D) Splanchnic block

### (3) Environmental heat

#### Tech (a) Naked patient in a room of $77^{\circ}$ F

For one hour

(b) Take temp. of symmetrical points

(c) Cover with three woollen blankets

(d) Repeat (b)

### (4) Hot air bath

(a) Normal immediate sharp thermal rise

(b) Spasm delayed but abrupt and high rise

(c) Occlusion no rise



*Before & after special tests take the temperatures of*

- (1) Mouth
- (2) Affected limb
- (3) Sound limb
- (4) Symmetrical points on the body

$$(A) \text{ Vascular index} = \frac{\text{Rise in affected limb}}{\text{Rise in mouth}}$$

$$(B) \text{ Vasomotor index} = \frac{\text{Skin rise} - \text{mouth rise}}{\text{mouth rise}}$$

$$(C) \text{ Direct index} = \frac{\text{Rise in affected limb}}{\text{Rise in normal opposite limb}}$$

*Thermal indications for sympathetic interference*

- (1) Higher vascular index
- (2) Vasomotor index more than 1.5
- (3) Higher direct index
- (4) Much rise in skin temperature  $> 5-6^{\circ}$
- (5) Temperature of affected limb equals to that of normal;

<i>Normal</i>	<i>Before</i>	<i>After</i>	<i>Rise</i>
Affected	$x-3$	$y$	$y-(x-3)$
Non-affected	$x$	$y$	$y-x$

- (6) Temp. gradient abolished after spinal
- (7) Delayed but more abrupt and higher thermal elevation
- (8) The skin temperature in affected limb approximates the normal level after diagnostic novocain block.

### (C) DERMAL TESTS

#### (1) Histamine test

Intradermal injection of 1 c.c. of 1 in 1000 histamine does not produce a wheal

#### (2) Saline test:

Intradermal injection of saline absorbed more rapidly in a vaso-constricted limb

### (D) FAILURE OF MEDICAL TREATMENT

Medical treatment of vasospasm

- Ind (a) Very mild cases with circulatory compensation  
 (b) Responding cases  
 (c) Non-progressive cases  
 (d) Pre and post operative

## (1) General treatment

(1) Postural Rest with protection from exposure

(2) Diet: Avoid tobacco and alcohol

(3) Treat the primary cause if any

(4) Injections

(a) T.A.B. or Typhoid H antigen

Intravenous 25-75 million every week

(b) Padeth (Bayer) (Pancreatic extract)

(a) Intramuscular  $\frac{1}{2}$ -2 units B.D.

(b) Oral 9-12 units T.D.S.

Ind Peripheral vessels

(c) Lacarbol (Heart muscle extract)

Ind Angina coronary vessels

(d) Carnation (Cavendish Chem. Co.)

Oral 10-30 min. T.D.S.

(e) Hypertonic saline

Intravenous 300 c.c. of 5%

Three times a week for one month

Ind To lower blood viscosity

## (2) Local treatment:

(a) Heat

(b) Diathermy

(c) Electro-therapeutics

(d) Active and passive exercises

(e) Physiotherapy

## (2) PAINFUL CONDITIONS

## (A) Angina pectoris

Anatomy Thoracic 1-6

↓ All cervical ganglia

↓ Superior middle, inferior cardiac nerves

↓ Heart

Treat (1) Paravertebral injection of alcohol T 1-6

(2) Stellatectomy

## (B) Visceral pain due to

(1) Inoperable carcinoma

(2) Tabetic crises

Treat Paravertebral injection of alcohol

## (C) Pelvic pain

Etio (1) Bladder (a) Inveterate cystitis

(b) T B cystitis

(c) Malignant bladder

(2) Rectum Carcinoma rectum

(3) Uterus

(a) Spasmodic inveterate dysmenorrhoea

(a) Failure of curettage

(b) Underdeveloped uterus

+ (r) Scanty menstruation

- (b) Inoperable carcinoma cervix  
 (4) Idiopathic pelvic neuralgia  
 Treat Presacral neurectomy  
 (D) Renal pain Due to renal sympathetico-tonus  
 Treat Sympathectomy of renal pedicle  
 Ind Eserine test positive  
 (E) Causalgia  
 Treat (1) Periarterial sympathectomy  
 (2) Ganglionectomy  
 (3) Posterior root resection Forster  
 (4) Antero-lateral tract division Spiller  
 Ind (a) Failure of conservatism  
 (b) Presence of vasomotor phenomenon  
 (c) Absence of psycho-neurotic factor

### (3) SECRETORY DISTURBANCES

- (A) Excessive sweating Hyperhidrosis  
 (a) Face excision of superior cervical ganglion  
 (b) Hands stellatectomy  
 (c) Feet lumbar ganglionectomy  
 (B) Parotid fistula  
 Treat Avulsion of auriculo-temporal nerve  
 Ind Failure of other methods  
 Sequela Deformity due to parotid atrophy

### (4) RELIEF OF INVOLUNTARY SPASMS

- (A) Hirschsprung and colonic atasis  
 Anatomy L 1 and 2  
 ↓ White rami communicans  
 ↓ L 1 and 2 ganglia  
 ↓ Inferior mesenteric ganglion  
 ↓ Presacral nerve  
 ↓ Colon and rectum  
 Ind Rapid evacuation of barium enema after spinal  
 Object Relief of sympathetic inhibitory effect on peristalsis  
 Operations (1) Adson  
 Uni or Bi lateral lumbar ganglionectomy  
 (2) Waddell (a) White ramisection  
 + (b) Lumbar splanchnic resection  
 + (c) Lumbar cord section  
 (3) Trumble Inferior mesenteric neurectomy  
 (4) Rankin:  
 (a) Inferior mesenteric neurectomy  
 + (b) Presacral neurectomy  
 (5) Adamson  
 (a) Inferior mesenteric neurectomy  
 + (b) Presacral neurectomy  
 + (c) Lumbar splanchnic resection

**(B) Retention of urine Cord bladder**

Etiology (1) Spinal trauma or disease

(2) Nerve diseases

Anatomy (1) Lumbar sympathetic

↓ Presacral nerve

↓ Micturition inhibitor

(2) Sacral parasympathetic

↓ Nervi erigentes

↓ Micturition stimulator

Treat Presacral neurectomy

Object Relief of spasm of internal sphincter

Ind (a) No total paralysis of nervi erigentes

(b) Urinary continence present

(c) Renal function good

**(C) Bronchial asthma**

Treat Stellatectomy

**(D) Cardiospasm**

Treat Resection of coronary or left gastric artery

**(E) Sympathetic hydronephrosis and hydro-ureter**

Treat (a) Renal pedicle sympathectomy

+ (b) Presacral neurectomy

**(V) PREOPERATIVE INVESTIGATIONS IN SYMPATHETIC OPERATIONS:**

(I) History Alcohol tobacco, rye bread

Race, sex, family

(II) Septic focus

(III) Circulatory condition Blood pressure  
Peripheral pulses  
Condition of arteries

(IV) Pathological exam.

(a) Blood: (a) Wassermann or Kahn

(b) Chemical sugar

(b) Urine: Sugar

(V) Special investigations

(A) Peripheral blood vessels

(a) Postural tests

(a) Ordinary

(b) Buerger

(b) Thermal tests

Estimation of (1) Vascular index  
(2) Vasomotor index  
(3) Direct index

(a) Protein shock

(b) Sympathetic block by

(1) Peripheral nerve block

(2) Spinal anesthesia

- (3) Paravertebral novocain block
- (4) Splanchnic block
- (r) Environmental heat
- (s) Hot air bath
- (c) **Dermal tests :**
  - (a) Histamine test
  - (β) Saline test
- (d) **Arteriography**  
With Thorotrast or Uroselectan B.
- (B) **Visceral vascular lesions**
  - Retinoscopy (a) Before thermal tests
  - (b) After thermal tests
- (C) **Alimentary canal affections**
  - \ Ray barium meal and enema
  - (a) Plain
  - (b) After spinal or paravertebral block
- (D) **Renal sympathetico-tonus :**
  - \ Ray of renal pelvis
  - (a) Plain
  - (b) After eserine injection
  - (c) After spinal or paravertebral block
- (E) **Sympathetic pain :**  
Effect of paravertebral sympathetic block

## (VI) OPERATIONS ON THE SYMPATHETIC SYSTEM :

### (1) PERI ARTERIAL SYMPATHECTOMY

- Tech** (a) Sheath resection  
or (b) Alcohol injection  
With or without ligation of the vein
- Ind** (1) **Palliative**
- (A) *As an aid to healing of chronic foci*
    - (a) Chronic ulcers varicose
    - (b) Trophic ulcers perforating
    - (c) Leprotic ulcers
    - (d) Kraurosis vulvæ
  - (B) *As an aid to separation and healing*
    - (a) Senile gangrene
    - (b) Diabetic gangrene
  - (C) *Betterment of vascular supply*
    - (a) **Bones**
      - (a) Delayed union of fractures
      - (β) Chronic osteoporosis
    - (b) Joints : chronic arthritis
    - (c) Volkmann's contracture
- (2) **Preliminary To amputations**
- (a) To get a stump as long as possible
  - (b) To get good healing of the stump end

- Sites (A) Peripheral (a) Brachial Volkmann  
 (b) Femoral gangrene  
 (B) Visceral (a) Gastric gastric ulcer  
 (b) Inf. mesent Hirschsprung  
 (c) Renal sympathetico-tonus

- Steps (1) Local anaesthesia  
 (2) Exposure of vessel  
 (3) (A) Adventitiectomy  
 (a) Injection of normal saline in adventitia  
 ↓ (b) Resection of sheath and adventitia:  
 (a) For 6-10 cms.  
 (b) Down to muscular coat  
 ↓ (c) Stop the artery with 90% alcohol  
 or (B) Injection of absolute alcohol in adventitia  
 (a) 15-20 minims  
 (b) All round the circumference  
 (c) In periarterial tissues & under the sheath  
 + (4) Tie the main vein  
 (5) Closure

- Difficulties (a) Difficult exposure  
 (b) Injury to the artery  
 (c) Injury to other structures

- Post. treat (a) Raise the limb  
 (b) Protect the whole limb with cottonwool  
 (c) Keep the limb dry

- Result (1) Hot and red limb with stronger pulse  
 (2) Acceleration of healing process

## (2) ALCOHOL INJECTIONS

### (A) Paravertebral

- Ind (1) Angina pectoris  
 (2) Visceral pain  
 (3) Asthma  
 (4) As a pre-operative test before ganglionectomy

- Sites (1) Lumbar :

- Puncture (a) 7 cms. from midline  
 (b) Opposite first lumbar spinous process  
 (c) Immediately under last rib

- Angle (a) 45° to the sagittal plane  
 Till vertebral body is touched  
 ↓ (b) Withdrawal and anterior inclination  
 : Till vertebral body is slid over

### (2) Dorsal

- Puncture In the intervertebral foramina  
 At the innermost end of intervertebral space

- Tech (1) Suction  
 ↓ (2) Injection of 2 c.c. of 2% novocain

- (4) Expose and retract 2nd part of subclavian art
- (5) Separate the pleura from inner aspect of upper three ribs
- (6) Identify the ganglion on the neck of first rib
- (7) Excise the stellate and 2nd dorsal ganglia

- Dangers** Trauma to
- (1) Phrenic nerve
  - (2) Pleura haemothorax
  - (3) First and second thoracic nerves  
Post-operative neuralgia  
Arm paresis
  - (4) Subclavian artery
  - (5) Vertebral artery
  - (6) Thoracic duct

**Sequels** Horner's syndrome

**Preventive** Telford-Gask operation (Med. Ann. 1938)

- (a) Preserve stellate ganglion
- (b) Resect chain 2<sup>nd</sup>—3<sup>rd</sup> and lower down

**Advantages**

- (a) No eye changes
- (b) No failures

### (B) Lumbar ganglionectomy

- Anatomy**
- (1) Ganglia L2, 3, 4  
Ganglionectomy
  - (2) White rami: Lateral from cord to ganglia  
Ramiectomy
  - (3) Lumbar splanchnics Medial from L. 1 and 2  
Lumbar splanchnicectomy
  - (4) Presacral nerve Anterior to L. 5 and promontory  
Presacral neurectomy
  - (5) Inferior mesenteric plexus Around inf. mes. art  
Inf. mesenteric sympathectomy
  - (6) Lumbar cord Over common iliac artery  
Section of lumbar cord

- Indications**
- (1) Improvement of circulation
    - (a) Buerger
    - (b) Unhealing ulcers
    - (c) Polyarthritia
    - (d) Anterior poliomyelitis
  - (2) Painful conditions  
Causalgia
  - (3) Secretory conditions :  
Hyperhidrosis of feet
  - (4) Relief of spasm
    - (a) Hirschsprung
    - (b) Obstinate constipation

**Tech (A) Anterior approach (Transperitoneal)**

- (1) Spinal anaesthesia
- (2) High Trendelenburg
- (3) Incision  
Long left rectus abdo 2/3rds below umbilicus
- (4) Peritoneal incision
- (5) Procedure
  - (a) Left side
    - (1) Mobilisation of iliac colon by incising peritoneum lateral to it
    - ↓ (2) Elevation of peritoneum medially to expose lumbar vertebrae
  - (b) Right side
    - (1) Incision of peritoneum at the right border of inf. vena cava, or on the outer side of caecum and ascending colon.
    - ↓ (2) Retraction of inferior vena cava to the left
- (6) Identification and excision of sympathetic chain

- Difficulties**
- (1) Mesenteric glands
  - (2) Lumbar veins

**(B) Lumbar approach (Extraperitoneal)**

- (1) Spinal anaesthesia
- (2) Kidney position
- (3) Incision outer edge of erector spinae from 11 D to iliac crest  
↓ along the crest laterally 4
- (4) Muscle cut
- (5) Exposure of retroperitoneal tissues
- (6) Anterior displacement of peritoneum
- (7) Search for the chain:
  - (a) In front of quadratus lumborum and psoas
  - (b) Over the sides of vertebral bodies
  - (c) Below the inferior pole of the kidney

- Dangers** Trauma to
- (1) Ureter and spermatic vessels
  - (2) Inferior vena cava
  - (3) Lumbar veins

**(C) Muscle-splitting extraperitoneal (Med. Ann. 1939)**

**Tech:** Bigger McBurney

**Advantage** No paralytic ileus

**Sequelæ of sympathectomy**

- (1) Dry skin
- (2) Sensitisation of peripheral vessels

**Results of ganglionectomy**

- (1) Raynaud 85% cures
- (2) Buerger 85% cures
- (3) Poliomyelitis good



**(VII) NEW GROWTHS OF SYMPATHETIC SYSTEM:****(1) Ganglioneuroma****(A) Innocent**

Etiology Children

Site	(a) Sympathetic trunk	(α) Abdominal
		(β) Neck
		(γ) Thorax

(b) Adrenal medulla

Clinic	(a) Lobulated rounded	varying sized
	(b) Pressure symptoms	

**(B) Malignant**

Site (a) Retroperitoneal

(b) Posterior mediastinal

Path (a) Local infiltration

(b) Lymphatic metastases

**(2) Myelinic neuroma**

Site (a) Medulla

(b) Cord

(c) Pia mater

(d) Mediastinum

Path Masses of non myelinated nerve fibres

**(3) Neuro-blastoma**

Etiology Young age

Site Kidney and adrenals

Origin Neuro-ectoderm (precursor of sympathetic syst.)

Path Embryonic ganglion cells

Clinic	(1) Very malignant, large, retroperitoneal tumour
	(2) Metastases in skull brain, liver

**(VIII) IMPORTANT POINTS****(A) Anatomy and physiology :****(1) Functions of sympathetic**

(1) Stimulator of	(a) Circulatory system
	(b) Respiratory system
	(c) Glandular system

(2) Inhibitor of	(a) Intestines
	(b) Micturition.

**(2) Role of the sympathetic**

(1) Limbs	(a) Calibre of vessels	vaso-constriction
	(b) Sweat glands	hyperhidrosis
	(c) Hair pilomotor	
	(d) Voluntary muscles	increased tonus
(2) Abdomen	(a) Inhibition of intestinal peristalsis	
	(b) Inhibition of micturition.	

- (3) Acts of micturition and defaecation occur under parasympathetic control.
- (4) *Mechanism of micturition and defaecation*
  - (A) Lumbar sympathetic inhibitory
  - (B) Sacral parasympathetic motor
- (5) Sympathetic is a system of emotional and physiological emergencies. Parasympathetic is a system of body conservation by stimulating digestion, absorption and excretion.
- (6) The sympathetic reflex arcs are activated by lower centres which in their turn are activated by bulbar controlling centres, which are themselves dominated by highest diencephalic centre.
- (7) Sympathetic cords are channels for the passage of viscerosensory and visceromotor nerves supplying the blood vessels and other organs and the ganglions provide reflex stations for different visceral syndrome.
- (8) Excessive sympathetic nervous impulses produce
  - (a) Sphincter hypertonus
  - + (b) Hypo-peristalsis
 Such as
  - (1) Achalasia cardia
  - (2) Infantile pyloric stenosis
  - (3) Hirschsprung
  - (4) Peritonitic syndrome ileus.
- (9) Nerve-supply to the limb vessels does not run out in a continuous uninterrupted sheath, but reaches the vessels serially as reinforcements from peripheral nerves.
- (10) Sympathetic system
  - (1) Superficial fibres go along spinal nerves
  - (2) Deep fibres go along perivascular plexuses
  - (3) Sensory nerves from viscera pass along Sympathetic nerves
 ↓ White rami communicans  
 ↓ Spinal roots  
 ↓ Posterior root ganglia.
- (11) There is no third neurone present in adrenal gland, the connector fibre arborising around the excitor cells in the medulla.
- (12) Adrenalin is a sympathetico-mimetic substance augmenting and prolonging the action of the sympathetic.
- (13) Chemical products of the sympathetic and parasympathetic
  - (1) Thyroxin from thyroïd
  - (2) Adrenalin from adrenals
  - (3) Sympathin from sympathetic terminals
  - (4) Acetylcholin from parasympathetic terminals.

## (B) Sympathetic circulatory diseases

- (14) When gangrene occurs without evidence of disease in the main vessels of the limb sympathectomy is of great value but if the gangrene is associated with loss of main pulses in the limb high amputation is the only procedure.
- (15) In arterial diseases  
When arterial spasm is a complication of structural disease, the improvement following sympathectomy is likely to be short lived if organic changes are secondary to prolonged spasm sympathectomy if done in early stages will have beneficial and lasting results should be done within 3 months of the onset of intermittent claudication.
- (16) Differential diagnosis between Raynaud and Buerger
- |             |                                      |
|-------------|--------------------------------------|
| (1) Raynaud | (a) Cyanosis $\rightarrow$ hyperemia |
|             | (b) Normal pulse                     |
|             | (c) Superficial ungual gangrene      |
| (2) Buerger | (a) Cyanosis                         |
|             | (b) Weak or obliterated pulse        |
|             | (c) Whole digit gangrene             |
- (17) Sympathetic surgery is useless in
- |     |                                   |
|-----|-----------------------------------|
| (a) | Diffuse senile arterial disease   |
| (b) | Diffuse diabetic arterial disease |
| (c) | Syphilitic arteritis.             |
- (18) Angiospasm in any situation can be relieved and hypotension produced by an appropriate sympathectomy
- (19) Indication for sympathectomy in any form in any case of gangrene is  
*Vascular spasm > vascular sclerosis.* More the spasm factor and less the sclerotic factor more is the success of sympathetic interruption.
- (20) In every circulatory gangrene there are three factors
- |     |              |
|-----|--------------|
| (a) | Spasm        |
| (b) | Sclerosis    |
| (c) | Obstruction. |
- (21) Tests in sympathetic vascular diseases
- |                    |                        |
|--------------------|------------------------|
| (1) Postural tests | (a) Ordinary           |
|                    | (b) Buerger's          |
| (2) Thermal tests  | (a) Protein shock      |
|                    | (b) Sympathetic block: |
|                    | (a) Peripheral nerve   |
|                    | (b) Spinal             |
|                    | (c) Paravertebral      |
|                    | (d) Splanchnic         |
|                    | (e) Environmental heat |

- To find
- (d)  $\frac{1}{2}$  Hot air bath
  - (1) Vascular index
  - (2) Vasomotor index
  - (3) Direct index
- (3) Dermal tests
- (a) Histamine
  - (b) Saline.

- (22) Indications for sympathetic interruption in vascular diseases

After sympathetic block

- (a) Higher vascular indices
  - (b) Delayed but abrupt and high rise in temp.
  - (c) Temperature of affected limb coming to normal level
  - (d) Abolition of temperature gradient.
- (23) Failure to respond (dilate) and therefore to increase the temperature of the skin, is due to
- (a) Spastic disease
  - (b) Organic disease
- } of peripheral arterioles and capillaries.
- (24) Vasomotor centre in the medulla is sensitive to changes in body temperature of from 01 C to 04 C. The function of this centre and its vasomotor system is the control of body temperature in response to environmental temperatures through vaso-constriction and vaso-dilatation of superficial capillaries, which normally are constricted.

### (C) Painful sympathetic conditions

- (25) Individual is conscious only of those visceral parts of the body where reservoir is formed and malignancy is common in these visceral reservoirs of whose distension we are normally aware such as,
- (a) Stomach
  - (b) Pelvic colon and rectum
  - (c) Bladder
  - (d) Uterus.
- (26) Angina pectoris, when not due to valvular or advanced myocardial disease, is a surgical illness requiring
- (a) Stellatectomy
  - or (b) Paravertebral block.
- (27) Total thyroidectomy relieves the pain of angina pectoris permanently due to reduction of basal metabolic rate leading to diminished work of the heart.
- (28) Surgical treatment for angina (sympathectomy) may be dangerous as it removes the pain which is a sort of warning against overstrain.
- (29) Never undertake a re-amputation in painful stump.
- (30) Treatment of painful amputation stumps
- (1) Pain in absent limb high neurectomy

- (2) Sympathetic pain (positive nerve block test)
  - (a) Periarterial sympathectomy
  - (b) Ganglionectomy

- (31) Painful amputation stumps of three types
  - (1) Bulbous nerve endings tenderness on pressure  
Treat Excision
  - (2) Phantom limb sensations from absent limb  
Treat Ramisection
  - (3) Trophic changes + paroxysmal pain  
Treat Sympathectomy

- (32) Paravertebral sympathetic block at appropriate level is a most helpful test in the differentiation of sympathetic and organic pains and gives accurate estimation of advisability or otherwise of sympathetic ganglionectomy

- (33) Premenstrual pain contraindicates sympathectomy

#### (D) Secretory disturbances

- (34) Hyperidrosis and parotid fistula are the two conditions where sympathectomy is successful

#### (E) Involuntary spasms

- (35) In the natural course of the disease, spasmodic phenomena tend to become organic. Spasm of an involuntary muscle eventually leads to local congestion → lymphocytic infiltration → fibrosis → disappearance of muscle fibres.

- (36) General peritoneal irritation of infective origin sets up a major degree of sympathetic excitation leading to
  - (a) Spasm of regional sphincters
  - (b) Inhibition of intestinal peristalsis
  - (c) Functional obstruction  
giving rise to (a) Vomiting  
(b) Ileus.

- (37) Normal emptying time of renal pelvis is 1 c.c. per minute

#### (F) Other sympathetic diseases

- (38) In cases of ocular degenerations (primary optic atrophy, choro-retinitis, retrobulbar neuritis) cervico-dorsal ganglionectomy gives good results.

- (39) Sympathetic operation must never be undertaken in the presence of organic gynaecological lesion as a substitute for causal treatment. It may be used as an adjunct.

- (40) Hyperthyroidism is a state where thyroid is very responsive to requirements of metabolism, which makes an excessive demand due to an upset in the adrenal sympathetic system.

## (G) Indications for sympathectomy

- (41) Main indications for sympathetic interruption are
  - (1) Improvement of circulation  
Raynaud and Buerger
  - (2) Relief of visceral pain  
Pelvic pain angina pectoris
  - (3) Effect on secretion  
Hyperidrosis parotid fistula
  - (4) Involuntary muscle tone  
Hirschsprung cord bladder
- (42) Effects of sympathectomy
  - (1) Removal of tonic impulses to unstriated muscles
  - (2) Interruption of visceral afferent impulses.
- (43) The result, whether of pre or post ganglionic sympathectomy depends upon the severity of the disease and structural damage already present.
- (44) Sympathectomy for lymphatic oedema and elephantiasis has proved to be valueless.
- (45) Conditions for sympathectomy
  - (1) Vasospasm tests positive
  - (2) Absence of advanced sclerotic factor
  - (3) Sympathetic block test positive
    - (a) Relief of spasm
    - (b) Relief of pain.
- (46) Indications for renal sympathectomy
  - (1) Nephralgia renal pain without clinical tumour
  - (2) Small painful hydro-nephrosis
  - (3) Essential hæmaturia
  - (4) Prevention of reformation of calculi after nephrolithotomy
- (47) Sympathectomy offers the greatest chance of improvement or cure in the vast majority of diseases due to sympathetic dysfunction
  - (1) Forestalls and prevents gangrene
  - (2) Allows low amputation
  - (3) Relieves pain
  - (4) Cures chronic vascular conditions.
  - (5) Relieves retention of bowels and bladder
- (48) Sympathetic interruption in different conditions
  - (1) Pelvic carcinoma or intractable neuralgia  
Treat Presacral neurectomy
  - (2) Cardiospasm  
Treat Celiac or left gastric sympathectomy
  - (3) Megacolon diverticulosis, constipation  
Treat
    - (a) Lumbar ganglionectomy
    - (b) Inf mesent. sympathectomy
    - (c) Presacral neurectomy

(4) Cord bladder

Treat Presacral neurectomy

(5) Peritoneal syndrome ileus

Treat (a) Morphia + barbitones

↓ (b) Belladonna + bromides

↓ (c) Acetylcholin + prostigmin

(6) Causalgia

Treat Sympathectomy

## (H) Sympathetic operations

(49) Preganglionic sympathectomy is preferable to post ganglionic operation.

(50) Excision of 2nd 3rd and 4th lumbar ganglia with the intervening portion of the lateral sympathetic trunk is a preganglionic sympathectomy for the lower extremity

(51) Sympathetic cord division should be done

(1) Above inferior cervical ganglion

Below 2 D ganglion

(2) Above 2 L ganglion

Below 4 L ganglion.

(52) Procedures at the lumbar ganglionectomy

(a) Ganglionectomy proper L 2 3 4

(b) Ramisection white rami (lateral)

(c) Splanchnicectomy splanchnics (medial)

(d) Presacral neurectomy

(e) Inferior mesenteric sympathectomy

(f) Section of the lumbar cord.

(53) Stellate ganglionectomy gives rise to Horner's syndrome.

(54) Telford Gask operation is superior to stellatectomy as

(a) No eye changes

(b) No failures.

Tech Resection of 2-3 of thoracic sympathetic chain below the stellate ganglion which is preserved.

(55) Periarterial sympathectomy

(a) Should be done in conjunction with vein ligation

(b) In cases which may require ultimate amputation, the operation should be reserved as a preliminary to that step, to get its site as low as possible.

(c) Should never be done as a cure in

(α) Raynaud

(β) Buerger

(d) May be done as a palliative measure for the temporary betterment of vascular supply or as a preliminary to amputation.

(e) Effects of periarterial sympathectomy are temporary and do not last for more than 45 days.

- (f) Best time for amputation after preliminary periarterial sympathectomy is within a week from that step
- (g) Chief indications
  - (1) Chronic unhealing foot ulcers
  - (2) Vascular gangrenes for
    - (a) Speedy separation
    - (b) Low separation
    - (c) Low site of amputation
    - (d) Good healing flaps
  - (3) Betterment of vascular supply in
    - (a) Osteoporosis
    - (b) Chronic arthritis
    - (c) Myositis fibrosa

## (I) Results

- (56) Results of various procedures of sympathetic interruption
  - (1) Periarterial sympathectomy
    - (a) Effect local
    - (b) Effect temporary
  - (2) Ganglionectomy
    - (a) Effect more extensive than required
    - (b) Effect permanent
  - (3) Ramisection
    - (a) Regeneration possible
    - (b) Anatomical inconsistency
- (57) Sympathetic control is lost over the following by under mentioned procedures
  - (1) Lumbar ganglionectomy
    - (a) Colon and rectum
    - (b) Lower limb
  - (2) Presacral neurectomy + inf mesent. sympathectomy
    - (a) Colon and rectum
    - (b) Seminal vesicles + ejaculatory ducts + prostate  
(Sterile but potent)
    - (c) Danger to parasympathetic  
(Constipation)
  - (3) Perivascular inferior mesenteric sympathectomy  
Colon only
- (58) When operating upon the rectum, presacral neurectomy is performed at the time of preliminary laparotomy which decreases the incidence of post-operative retention of urine.





# **THE RESPIRATORY SYSTEM**



## CHAPTER I

# THE ADENOIDS AND THE TONSILS

### (I) THE ADENOIDS

#### ADENOID HYPERPLASIA

- Etiol** (1) Congenital  
 (2) Infancy and childhood  
 (3) Infection (a) Local  
                   (b) Secondary (a) Nasal  
   (β) Sinus  
   (γ) Ear  
   (δ) Tonsil
- (4) General lymphatic hyperplasia
- Path** (1) Inflammation  
           (a) Primary  
           (b) Secondary to (a) Nasal infection  
                                   (β) Sinus infection  
                                   (γ) Ear infection  
                                   (δ) Tonsil infection
- (2) Hyperplasia  
       (a) Primary  
       (b) Associated with enlarged tonsils  
       (c) Generalised lymphoid hyperplasia
- Clinic:** (a) Age  
           (b) Presence of one of the complications  
           (c) Associated enlarged tonsils  
           (d) Local examination
- Comp** (1) Nasal obstruction  
       **Clinic** (a) Facies  
                   (b) Oral respiration  
                   (c) Respiratory distress on exertion  
                   (d) Recurrent rhinitis
- Sequelæ** (a) Facies  
               (b) Mental sluggishness  
               (c) Nocturnal enuresis  
               (d) Retarded growth  
               (e) Deformed chest
- (2) Sinusitis  
**Clinic** Recurrent intractable coryza
- (3) Respiratory tract catarrhs  
       (a) Rhinitis  
       (b) Pharyngitis  
       (c) Laryngitis



## CHAPTER I

# THE ADENOIDS AND THE TONSILS

### (I) THE ADENOIDS

#### ADENOID HYPERPLASIA

- |                                      |  |                     |                                      |                                      |  |                     |                     |                   |                      |
|--------------------------------------|--|---------------------|--------------------------------------|--------------------------------------|--|---------------------|---------------------|-------------------|----------------------|
| Eto                                  | (1) Congenital<br>(2) Infancy and childhood<br>(3) Infection <table border="0" style="display: inline-table; vertical-align: middle;"> <tr> <td style="padding-left: 10px;">(a) Local</td> <td></td> </tr> <tr> <td style="padding-left: 10px;">(b) Secondary</td> <td> <table border="0" style="display: inline-table; vertical-align: middle;"> <tr> <td style="padding-left: 10px;">(a) Nasal</td> </tr> <tr> <td style="padding-left: 10px;">(β) Sinus</td> </tr> <tr> <td style="padding-left: 10px;">(γ) Ear</td> </tr> <tr> <td style="padding-left: 10px;">(δ) Tonsil</td> </tr> </table> </td> </tr> </table>           | (a) Local           |                                      | (b) Secondary                        | <table border="0" style="display: inline-table; vertical-align: middle;"> <tr> <td style="padding-left: 10px;">(a) Nasal</td> </tr> <tr> <td style="padding-left: 10px;">(β) Sinus</td> </tr> <tr> <td style="padding-left: 10px;">(γ) Ear</td> </tr> <tr> <td style="padding-left: 10px;">(δ) Tonsil</td> </tr> </table>  | (a) Nasal           | (β) Sinus           | (γ) Ear           | (δ) Tonsil           |
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| (a) Nasal                            |  |                     |                                      |                                      |  |                     |                     |                   |                      |
| (β) Sinus                            |  |                     |                                      |                                      |  |                     |                     |                   |                      |
| (γ) Ear                              |  |                     |                                      |                                      |  |                     |                     |                   |                      |
| (δ) Tonsil                           |  |                     |                                      |                                      |  |                     |                     |                   |                      |
|                                      | (4) General lymphatic hyperplasia  |                     |                                      |                                      |  |                     |                     |                   |                      |
| Path                                 | (1) Inflammation <table border="0" style="display: inline-table; vertical-align: middle;"> <tr> <td style="padding-left: 10px;">(a) Primary</td> <td></td> </tr> <tr> <td style="padding-left: 10px;">(b) Secondary</td> <td>to           <table border="0" style="display: inline-table; vertical-align: middle;"> <tr> <td style="padding-left: 10px;">(a) Nasal infection</td> </tr> <tr> <td style="padding-left: 10px;">(β) Sinus infection</td> </tr> <tr> <td style="padding-left: 10px;">(γ) Ear infection</td> </tr> <tr> <td style="padding-left: 10px;">(δ) Tonsil infection</td> </tr> </table> </td> </tr> </table> | (a) Primary         |                                      | (b) Secondary                        | to <table border="0" style="display: inline-table; vertical-align: middle;"> <tr> <td style="padding-left: 10px;">(a) Nasal infection</td> </tr> <tr> <td style="padding-left: 10px;">(β) Sinus infection</td> </tr> <tr> <td style="padding-left: 10px;">(γ) Ear infection</td> </tr> <tr> <td style="padding-left: 10px;">(δ) Tonsil infection</td> </tr> </table> | (a) Nasal infection | (β) Sinus infection | (γ) Ear infection | (δ) Tonsil infection |
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| (β) Sinus infection                  |  |                     |                                      |                                      |  |                     |                     |                   |                      |
| (γ) Ear infection                    |  |                     |                                      |                                      |  |                     |                     |                   |                      |
| (δ) Tonsil infection                 |  |                     |                                      |                                      |  |                     |                     |                   |                      |
|                                      | (2) Hyperplasia <table border="0" style="display: inline-table; vertical-align: middle;"> <tr> <td style="padding-left: 10px;">(a) Primary</td> </tr> <tr> <td style="padding-left: 10px;">(b) Associated with enlarged tonsils</td> </tr> <tr> <td style="padding-left: 10px;">(c) Generalised lymphoid hyperplasia</td> </tr> </table>   | (a) Primary         | (b) Associated with enlarged tonsils | (c) Generalised lymphoid hyperplasia |  |                     |                     |                   |                      |
| (a) Primary                          |  |                     |                                      |                                      |  |                     |                     |                   |                      |
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| (c) Generalised lymphoid hyperplasia |  |                     |                                      |                                      |  |                     |                     |                   |                      |
| Clinic                               | (a) Age<br>(b) Presence of one of the complications<br>(c) Associated enlarged tonsils<br>(d) Local examination  |                     |                                      |                                      |  |                     |                     |                   |                      |
| Compl                                | (1) Nasal obstruction  |                     |                                      |                                      |  |                     |                     |                   |                      |
|                                      | Clinic <table border="0" style="display: inline-table; vertical-align: middle;"> <tr> <td style="padding-left: 10px;">(a) Facies</td> </tr> <tr> <td style="padding-left: 10px;">(b) Oral respiration</td> </tr> <tr> <td style="padding-left: 10px;">(c) Respiratory distress on exertion</td> </tr> <tr> <td style="padding-left: 10px;">(d) Recurrent rhinitis</td> </tr> </table>  | (a) Facies          | (b) Oral respiration                 | (c) Respiratory distress on exertion | (d) Recurrent rhinitis   |                     |                     |                   |                      |
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|                                      | (2) Sinusitis  |                     |                                      |                                      |  |                     |                     |                   |                      |
|                                      | Clinic Recurrent intractable coryza  |                     |                                      |                                      |  |                     |                     |                   |                      |
|                                      | (3) Respiratory tract catarrhs   |                     |                                      |                                      |  |                     |                     |                   |                      |
|                                      | <table border="0" style="display: inline-table; vertical-align: middle;"> <tr> <td style="padding-left: 10px;">(a) Rhinitis</td> </tr> <tr> <td style="padding-left: 10px;">(b) Pharyngitis</td> </tr> <tr> <td style="padding-left: 10px;">(c) Laryngitis</td> </tr> </table>   | (a) Rhinitis        | (b) Pharyngitis                      | (c) Laryngitis                       |  |                     |                     |                   |                      |
| (a) Rhinitis                         |  |                     |                                      |                                      |  |                     |                     |                   |                      |
| (b) Pharyngitis                      |  |                     |                                      |                                      |  |                     |                     |                   |                      |
| (c) Laryngitis                       |  |                     |                                      |                                      |  |                     |                     |                   |                      |

**(β) Pathological**Clinic (a) **Local chronic signs**

(α) Hypertrophy

(β) Atrophy

(γ) Follicular

(b) Regional lymphadenitis

(c) Distant complications

(α) Present

(β) Absent

(γ) **Latent** (α) No local signs

(b) Regional lymphadenitis

(c) Distant complications

(α) Present

(β) Absent

(δ) **Focal**

(α) No local or regional signs

(b) Distant complications only

(b) **Secondary** To acute tonsillitis(α) **Unresolving** Acute → subacute(β) **Relapsing** Acute → subacute → acute(γ) **Recurrent** Exacerbations of acute(B) **Specific**

(α) Diphtheritic

(b) Tuberculous

(c) **Syphilitic**; (α) Chancre unilateral

(β) Secondary tonsillitis

(γ) Gumma: unilateral

Diag Wassermann or Kahn

**(IV) TUMOURS:**(1) **Simple** (α) Papilloma

(b) Polypi

(c) Lymphangioma

(2) **Malignant**(a) **Sarcoma**

Path Lymphosarcoma

Clinic (α) Rapid unilateral fleshy enlargement

(β) Rapid and big mass of cervical glands

Treat Deep X Rays

(b) **Carcinoma**

Path Squamous

Clinic (α) Unilateral enlargement

(β) Secondary glands

(c) **Endothelioma** Malignant**(V) TONSILLECTOMY:****Indications**(1) **Local**(A) **Chronic hyperplasia** Obstruction to respiration

## (B) Tonsillitis

- (a) Six weeks after acute tonsillitis
- (b) Recurrent tonsillitis
- (c) Chronic tonsillitis
  - (a) Pus from crypts by pressure
  - (β) Purplish red anterior pillar
  - (γ) Enlarged tonsillar lymph gland
  - (δ) Leucocytosis in tonsillar crypts

(C) After peri or para tonsillar abscess

(D) Growths of the tonsil

## (2) Regional

(A) Recurrent rhinitis, sinusitis, otitis, pharyngitis

(B) Upper cervical adenitis

- (a) Acute
- (b) Recurrent
- (c) Chronic

(C) Tonsil facies

## (3) Distant

- (a) Arthritis
- (b) Myositis, fibrositis, fascitis rheumatism
- (c) Heart lesions
- (d) Thyrotoxicosis
- (e) Nephritis
- (f) Capricious pyrexia

(4) General Stunted growth

*Preoperative preparation*

- (1) Treatment of
  - (a) Deficiency diseases rickets
  - (b) Mouth sepsis oral hygiene
  - (c) Nasopharyngeal sepsis
  - (d) Respiratory sepsis vaccines

## (2) Investigations

(a) Blood

- (a) Coagulation time 3-5 minutes
- (β) Bleeding time 1-3 minutes

If prolonged

- (1) Calcium by mouth and injections
- (2) Sera
- (3) Vitamine K kapilin (Glaxo)
- (4) Alkalies to neutralise the urine

One teaspoonful of soda bi-carb in a glass of water B. D

- (b) Heart
- (c) Lungs
- (d) Thymus, lymph glands
- (e) Urine
- (f) Liver

## (3) Immediate preoperative treatment

- (a) Therapy for three days previous
  - (a) Glucose oral or intravenous



**(β) Pathological**Clinic (a) **Local chronic signs**

(α) Hypertrophy

(β) Atrophy

(γ) Follicular

(b) **Regional lymphadenitis**(c) **Distant complications**

(α) Present

(β) Absent

(γ) **Latent** (α) **No local signs**(b) **Regional lymphadenitis**(c) **Distant complications**

(α) Present

(β) Absent

(δ) **Focal**(α) **No local or regional signs**(b) **Distant complications only**(b) **Secondary** To acute tonsillitis(α) **Unresolving** Acute → subacute(β) **Relapsing** Acute → subacute → acute(γ) **Recurrent** Exacerbations of acute(B) *Specific*(α) **Diphtheritic**(β) **Tuberculous**(c) **Syphilitic** (α) **Chancre unilateral**(β) **Secondary tonsillitis**(γ) **Gumma unilateral**

Diag Wassermann or Kahn

**(IV) TUMOURS:**(1) **Simple:** (α) **Papilloma**(b) **Polypi**(c) **Lymphangioma**(2) **Malignant**(a) **Sarcoma**Path **Lymphosarcoma**Clinic (α) **Rapid unilateral fleshy enlargement**(β) **Rapid and big mass of cervical glands**Treat **Deep X Rays**(b) **Carcinoma**Path **Squamous**Clinic (α) **Unilateral enlargement**(β) **Secondary glands**(c) **Endothelioma: Malignant****(V) TONSILLECTOMY:***Indications*(1) **Local:**(A) **Chronic hyperplasia: Obstruction to respiration**

- (B) Tonsillitis
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  - (b) Heart
  - (c) Lungs
  - (d) Thymus lymph glands
  - (e) Urine
  - (f) Liver
- (3) Immediate preoperative treatment
- (a) Therapy for three days previous
    - (a) Glucose oral or intravenous

- (β) Calcium intravenous
- (γ) Sera<sup>1</sup> intramuscular
- (b) Mild aperient two days previous
- (c) Restricted diet for two days previous
- (d) Mental reassurance sedative the night before

#### *Positions during operation*

- (1) Recumbent With sand-bags below the shoulders
- (2) Semilateral
- (3) Sitting

#### *Anæsthesia*

- (1) Basal anæsthetic
  - (a) Nembutal
  - or (b) Avertin
  - or (c) Paraldehyde per rectum  
(Drachm one per stone of body weight in a few ounces of saline, two hours before operation)
- (2) Inf atropine Half an hour before operation
- (3) Anæsthesia proper
  - (A) General
    - (a) Ethyl chloride } not in children
    - (b) Chloroform }
    - (c) Ether
    - (d) C. E. mixture
  - (B) Local:
    - (a) Local application of 10% cocain + adrenalin
    - ↓ (b) Local injection of 5% novocain
    - ↓ (c) Rest for 10 minutes

#### *Special requirements*

- (1) Head lamp
- (2) Tracheotomy set
- (3) Tonsil clamp
- (4) Ice

#### *Operations*

- (1) Guillotine method:
  - Ind Tumour tonsil
- (2) Dissection method
  - Ind (a) Atrophic tonsil
  - (b) Adherent tonsil
  - (c) Buried tonsil
- (3) Other methods (a) Diathermy (b) Snare
  - Ind (a) Quiescent tonsil
  - (b) Septic tonsil
  - (c) Malignant tonsil

#### *Tech*

- (1) Guillotine operation
  - (a) Save the uvula
  - (b) Save the faucial pillars

(c) Remove the superior pole

(d) Remove the inferior pole

Always carry the handle right towards the opposite angle of the mouth, so that the blade lies perfectly parallel to the anterior faucial pillar at the time of driving the handle home.

## (2) Dissection method

(a) Hold the tonsil by volsellum forceps

(b) Incise the muc. mem. of the superior angle

(c) Tear the muc. mem. attachments all round the tonsil except at inferior pole

(d) Blunt dissection of the tonsil off its bed

(e) Tearing or snaring of the isthmus between the tonsil and the tongue

(f) Control of hæmorrhage

(a) Sponge pressure from opposite side

(b) Ligature of bleeding points

(c) Application of ice from outside

## (3) Diathermy dissection

Ind Malignancy

Adv No primary hæmorrhage

Disadvant: (a) Difficulty in removing the whole tonsil

(b) Post-operative pain

(c) Secondary infection with œdema

(d) Secondary hæmorrhage

(e) Scar tissue

Tech (a) Diathermy knife

(b) Diathermy knobs multiple sittings

Ind Poor operative risks

## (4) Snare

Tech (1) Dissection

↓ (2) Snaring the tonsil

## Post-operative management

### (1) Position

(A) In bed for 24 hours

No pillow

Head low

On the side

(B) Sitting after 24 hours

(C) Indoors for 3 to 5 days

(2) Diet (A) First 72 hours cold liquids

(B) 4th to 7th day soft semi solids

(3) Pain (A) Aspirin (a) Locally insufflation

(b) Internally

(B) Anæsthesin powder or novocaine

(4) Wound Spray or gargles after 24 hours to 10

- (5) Tonics and change of climate For three months
- (6) Nasal breathing exercises after first week
- (7) Deafness auditory tube inflation
- (8) Voice production and correct phonetics

*Post-operative care*

- (1) Make sure that no sputter is left unligated and bleeding when the patient leaves the operation table
- (2) Make sure that no swab is left in
- (3) Make sure that the respiratory passages are clear  
Insert nasal catheter in each nostril
- (4) Nurse to be present till anaesthesia wears off
- (5) Keep on the tongue forceps till all reflexes return
- (6) Mind the vomit till patient comes out of anaesthesia

*Post-operative complications*

- (1) Failure or stoppage of respiration Chloroform
- (2) Sudden collapse status thymo-lymphaticus
- (3) Haemorrhage

Varieties (A) Primary immediate

(B) Reactionary within 12 to 48 hours

(C) Secondary 4th to 7th day

Etio (A) Local (a) Trauma to blood vessels  
(b) Acute sepsis

(B) General long bleeding and coagulation time

Clinic (A) Local exits

(a) Mouth

(b) Nose

(c) Vomit

(d) Stools

(B) General signs of haemorrhage

Treat (A) General

(a) Morphia

(b) Coagulants

(c) Blood transfusion

(B) Local

(a) Ice internally & externally

(b) BIPP gauze with silk anchor

(c) Tonsil clamp

(d) Ligature of bleeding points

(e) Suture of pillars over a swab

(4) Trauma To faucial pillars, uvula, tongue

(5) Septicæmia:

Etio Tonsillectomy in acute stage

(6) Lung affections

Bronchitis, broncho-pneumonia, lobar pneumonia  
lung abscess, pulmonary embolism

Causes (a) Aspiration

(b) Embolism

- (7) Bacteriæmia endocarditis, rheumatism nephritis
- (8) Otitis media and mastoiditis
- Etiol (a) Tonsillectomy in acute stage
- (b) Local anæsthesia
- (9) Deep cervical infection
- Etiol Infected local anæsthetic solution
- Clinic (a) Phlegmonous
- (b) Septicæmic
- (10) Tonsil and adenoid remnants
- (11) Glottic spasm
- (12) Exanthemata

#### Results of tonsillectomy

- (1) General health : nearly always good
- (2) Nose, throat and chest conditions : good
- (3) Hearing : good if done early
- (4) Aural discharge : good unless old
- (5) Oral respiration : nearly always good if done early
- (6) Enlarged cervical glands : nearly always good

#### I) PERITONSILLAR ABSCESS: Quinsy

Def Suppurative inflammation of the cellular tissues of the tonsillar bed

- Path (1) Cellulitis
- ↓ (2) Abscess
- (a) Peritonsillar In supratonsillar fossa
  - (b) Paratonsillar In lateral bed
  - (c) Parapharyngeal Behind posterior pillar

- Clinic (1) General Toxæmia
- (2) Reflex
- (a) Dysphagia
  - (b) Dyspnoea
  - (c) Trismus
  - (d) Earache

#### (3) Local

##### (A) Peritonsillar

Fluctuating acute inflammatory swelling in supratonsillar fossa with bulging upper end of the anterior faucial pillar

##### (B) Paratonsillar

Prominent medially displaced tonsil sitting on a cushion of fluctuating pus on its lateral side

##### (C) Parapharyngeal

- (a) No œdema of the palate
- (b) Obliteration of recess behind the posterior pillar

**Compl (1) Spontaneous hæmorrhage****Cause** Erosion of ascend. pharyng artery**Clinic** (a) Spurious aneurysm in pharyngeal wall  
↓ (b) Hæmorrhage**Treat** Ligature of external carotid(2) **Extension** (a) Outwards  
(b) Downwards(3) **Laryngeal œdema****Treat (A) Conservative**(1) **Purge** full dose of calomel(2) **Intramuscular**

(a) Colloidal manganese

(β) Manganese butyrate

(3) **Sulphonamide therapy**(4) **Hot gargles and fomentations**↓ **(B) Operative****Ind Localisation** As shown by

(a) Dysphagia or trismus

(b) Diminution of throbbing

(c) Œdema muffled voice

(d) Remittent fever

(e) Leucocytosis &gt; 16000

**Anæsth (1) General Ether****Ind (a) Trismus**

(b) Nervous patient

**Position** Supine

+ Neck extension

+ Face turned to affected side

**Caution (1) Tracheotomy set**(2) **Preserve pharyngeal reflex**(2) **Regional**

20% solution of cocaine on a pellet of cotton-wool inserted into the nose, in contact with the sphenopalatine ganglion at the posterior end of the middle turbinal.

(3) **Local Carbolic acid paint****Tech (1) Small incision****By** Strapped scalpel or special knife**At (a) Most prominent part**

or (b) Midway between uvula and last upper molar

or (c) Under the arch formed by anterior and posterior faucial pillars

or (d) Behind the posterior pillar

↓ (2) **Hilton's method**

By (a) Forceps  
(b) Finger

Direction **Directly backwards for 3 cms.**

↓ (3) **Mop out the pus immediately**

After treat (a) Allow to sit and spit out blood and pus  
(b) Gargles

## (VII) IMPORTANT POINTS

### (A) Clinical aspects

- (1) Clinical types of tonsillitis
  - (A) (1) Acute
  - (2) Recurrent
  - (3) Chronic
  - (4) Latent
  - (B) (1) Obstructive
  - (2) Inflammatory
  - (3) Focal (a) Regional focus  
(b) Distant focus.
- (2) Unilateral prominence of tonsils
  - (1) Peritonsillar abscess
  - (2) Gumma
  - (3) Malignancy
- (3) Tonsil-adenoid symptom-complex
  - (1) Recurrent nasal catarrh
  - (2) Ear inflammation
  - (3) Sinusitis
  - (4) Cervical adenitis
  - (5) Facies and chest configuration
  - (6) Cyanosis complex
  - (7) Chest diseases
  - (8) Endocarditis rheumaticum
  - (9) Thyroid toxemia
  - (10) Distant affections.
- (4) Most certain proof of chronic tonsillitis is the recurrence of acute attacks.
- (5) Every case of enlarged cervical glands examine the tonsils
  - (a) Inflammatory
  - (b) Specific
  - (c) Malignant.
- (6) In all cases of ulcers or enlargements of the tonsils, take the Wassermann or Kahn.
- (7) Do not forget diphtheria in every case of tonsillitis.

### (B) Complications

- (8) Majority of cases of otitis media start with primary infection in the adenoid or tonsil bed.



- (9) Repeated cervical adenitis is very suggestive of adenoid or/and tonsil infection.
- (10) Sinus infections in childhood are due to stasis of secretions in the nose, secondary to adenoid obstruction.
- (11) In every case of chronic cervical adenitis, where T. B. is suspected, examine the tonsils microscopically.
- (12) 60% of cases admitted for tonsillectomy carry streptococcus haemolyticus in the throat.

#### (C) Indications for operation

- (13) Do adenoidectomy and tonsillectomy in all cases of chronic otitis media and mastoiditis.
- (14) *Indications for adenoidectomy & tonsillectomy*
  - (1) *Respiratory obstruction and its effects*
    - (a) Deformities
    - (b) Cyanosis complex
  - (2) *Recurrent respiratory inflammations*
    - (a) Rhinitis
    - (b) Sinusitis
    - (c) Pharyngitis and retropharyngeal abscess
    - (d) Chest inflammations
  - (3) *Chronic otitis media with its sequelae*
  - (4) *Cervical adenitis*
  - (5) *Distant complications.*
- (15) Tonsillectomy is indicated in diphtheria carriers.
- (16) If the history shows a definite connection between an attack of tonsillitis and any other distant condition tonsils should be removed even if no signs of tonsillitis are present.
- (17) It is the duty of a surgeon to remove the tonsils which after a careful examination are believed to be the source of infection which produces or aggravates pathological lesions, either locally or regionally or generally.
- (18) There could be no question that tonsils should be removed if enlarged and mechanically obstructing or if demonstrably diseased and infected.

#### (D) Contraindications

- (19) *Never do tonsillectomy in an acute inflammatory stage*  
Allow at least six weeks after a severe attack. Septicæmia follows tonsillectomy in acute stage.
- (20) Unless they actually obstruct the airway removal of uninfected tonsils can do no good.
- (21) Avoid tonsillectomy for at least six weeks in a case with recently developed cold or pyrexia.
- (22) *Never open a para or peritonsillar abscess before it has localised*

**(E) Anaesthesia**

- (23) Ethyl chloride and pure chloroform should never be given alone in children in tonsillectomies.
- (24) In every tonsillectomy in children exclude status thymolympathicus.
- (25) *In every tonsillectomy keep the tracheotomy set ready*
- (26) *Keep the pharyngeal reflexes present* in every throat operation for the prevention of aspiration complications.

**(F) Operation**

- (27) It is very important to remove the adenoids correctly and completely without injury to the surrounding structures.
- (28) Guillotine operation
  - (a) Do not exclude superior and inferior poles
  - (b) Do not include
    - (1) Uvula
    - (2) Anterior faucal pillar
    - (3) Tongue
  - (c) Guillotine handle to opposite corner of the mouth
  - (d) Guillotine blade parallel to anterior faucal pillar with constant thumb pressure over the latter
- (29) After adenoidectomy palpate the mouths of eustachian tubes after tonsillectomy inspect carefully the tonsillar beds.
- (30) *No patient should leave the operation table after tonsillectomy until it is certain that all hæmorrhage has stopped.*
- (31) Torn veins cyanosis and straining are responsible for operative bleeding in tonsillectomy another important cause is incomplete removal of a tonsil
- (32) Throughout tonsillectomy airway must be kept clear
- (33) Second tonsil should never be removed until the hæmorrhage from the first tonsillar fossa has been completely arrested
- (34) Never forget to examine minutely the tonsillar fossæ and the nasopharynx at the close of a tonsillectomy for
  - (a) Remnants and tags
  - (b) Bleeding points.
- (35) In peritonsillar abscess
  - (a) Always wear a mask
  - (b) Push the forceps directly backwards
  - (c) Allow the patient to bend forwards immediately and spit out the pus and blood.
- (36) Important points in tonsil operations
  - (1) Blood and lymphatic system examination
  - (2) Tracheotomy set

- (3) Wear a mask
- (4) Preserve the pharyngeal reflex
- (5) Avoid aspiration of pus or blood
- (6) Be sure of hæmostasis.

#### (G) Post-operative

- (37) Post tonsillectomy care
  - (a) Spurters
  - (b) Swabs
  - (c) Respiratory obstruction or aspiration.
- (38) In every case of tonsillectomy keep a close watch on
  - (a) Respirations
  - (b) Expectoration blood
  - (c) Vomit bleeding or aspiration
  - (d) Stools altered blood
  - (e) General condition restlessness  
pallor  
pulse.
- (39) In every tonsillectomy tell the relatives or the nurse to expect hæmatemesis after recovery from the anaesthesia.
- (40) Brighter and same or more the successive quantities of blood in hæmorrhage after a tonsillectomy more important it becomes to treat the cause.
- (41) Steps to arrest bleeding must be active when
  - (a) Blood is brighter
  - (b) Same or increasing successive quantities
  - (c) No decline in frequency or decline in frequency replaced by bulky hæmatemesis
  - (d) General signs of hæmorrhage getting worse.
- (42) Pulmonary sequelæ of tonsillectomy in children
  - (1) Pneumonia
  - (2) Lung abscess
  - (3) Aspiration of foreign body

#### (H) Miscellaneous :

- (43) If a new born babe is not breathing well pass a well lubricated nasal catheter into the pharynx.
- (44) In case of juvenile asthma, examine
  - (a) Tonsils
  - (b) Adenoids
  - (c) Nasopharynx.
- (45) *Every case of stomatitis tonsillitis or pharyngitis in a child Suspect diphtheria*
- (46) There seems to be no certain means of distinguishing microscopically the tonsil of a healthy subject from the tonsil of a patient liable to attacks of tonsillitis or of its complications.

- (47) Nothing gives a surgeon greater confidence than the knowledge that he can cope with any bleeding at any time and in any place, with a cool head.
- (48) Tonsillar infection and sore throat may be due to infection from above
- Sore throat ? Tonsillitis
  - ? Sinusitis
  - ? Otitis media
-

## CHAPTER II

# PHARYNX, LARYNX AND TRACHEA

## (I) PHARYNX

### (I) CONGENITAL

#### Diverticulum of the pharynx

Blind internal branchial fistula opening into the pharynx behind the tonsil (fossa of Rosenmüller)

### (II) TRAUMA:

#### (1) WOUNDS

Etio Incised wounds above the hyoid : suicidal

Clinic Escape of (a) Air  
(b) Saliva  
(c) Water or food

Compl : Cervical cellulitis

Treat (1) Suture  
↓ (2) Drainage of the superficial tissues  
↓ (3) Tubal feeding

#### (2) HÆMORRHAGE

Etio (1) Trauma  
(2) Secondary to (a) Quinsy  
(b) Malignancy

Source (1) Tonsillar branch of descending palatine  
(2) Tonsillar branch of dorsalis linguae

Treat (A) Moderate  
(1) Gauze pack turpentine  
+ (2) 20 c.c. coagulen intramuscular  
↓ (3) Tonsillectomy under ether  
↓ (4) Secure and ligature the vessel  
(5) Stitch the pillars over a gauze swab  
(B) Severe  
(1) Internal gauze pack  
+ External pressure against jaw ramus  
+ (2) Blood transfusion  
↓ (3) Ligature of ext. carotid  
With ascending pharyngeal art

### (III) INFLAMMATIONS:

#### (A) ACUTE, SUBACUTE AND CHRONIC PHARYNGITIS

##### (1) Primary

- (2) Secondary to (a) Nasal and sinus affections  
 (b) Ear affections  
 (c) Tonsil affections  
 (d) Extrapharyngeal causes

## (B) ABSCESSSES OF THE PHARYNX

- (1) **Peritonsillar abscess** (See under Tonsils)  
 (2) **Parapharyngeal abscess** (See under Tonsils)  
 (3) **Retropharyngeal abscess**  
 (A) **Acute retropharyngeal abscess**  
 Etio Children 5 months to 3 years  
 Cause (a) Trauma with infection pharyngeal  
 (b) Acute retropharyngeal lymphadenitis  
 Clinic (1) Very severe constitutional signs  
 (2) Pharyngeal obstruction  
 (a) Dysphagia  
 (b) Dyspnoea *crowing respiration*  
 (3) Reflex signs  
 (a) Earache  
 (b) Rigid retracted neck  
 (4) Acute swelling in the oropharynx  
 (5) Cervical lymphadenitis

- Diff. diag (1) Acute pharyngitis  
 (2) Diphtheria

Treat Hilton's evacuation in reversed position

Stand by Tracheotomy set

Anæsth (a) Pre-anæsthetic atropine

(b) Anæsthetic (a) Nil

(b) General ethyl chloride

Position Head hanging down

Tech (1) Aspiration or small incision

↓ (2) Section drain or immediate swabbing

↓ (3) Enlarge the opening

After-treat (1) Trendelenburg position

(2) Mouth toilet with fluid food

(3) Bowel regulation

(4) Watch for dyspnoea

Post. compl Oedema glottis

## (B) Chronic retropharyngeal abscess

Etio Children 4 to 16 years

Causes (1) T B. glands

Between pharynx & prevertebral fascia

(2) T B. spine

Behind prevertebral fascia

Clinic Slow fluctuating swelling behind the pharynx, with fullness behind the sternomastoid in the posterior triangle of the neck.

*Diff diag of pharyngeal malignancy*

- (1) Precancerous epitheliomatosis Bowen
- (2) Quinsy gumma of the tonsil
- (3) Syphilis
- (4) Polypi

*Treatment of pharyngeal malignancy*

- (A) Preoperative
  - (1) Antisepsis of the mouth
  - (2) Extraction of bad teeth
  - (3) Avoidance of ether in diathermy
- (B) Primary growth
  - (1) Radium Needles or bomb
  - (2) Deep X Rays
  - (3) Diathermy
  - (4) Operative Trotter's transthyroid route
  - (5) Gastrostomy Palliative
- (C) Secondary cervical glands :
  - (a) Impalpable
    - (a) Prophylactic radiation
    - (b) Close and repeated observation
  - (b) Impalpable but infiltrative primary
 

Simultaneous removal of both with prophylactic  
ligature of ext. carotid art.
  - (c) Palpable
    - (a) Removal
    - + (b) Ligature of external carotid  
(10 days before the treatment of primary)

*Post-operative complications*

- (1) Secondary hemorrhage
- (2) Aspiration pneumonia
- (3) Inanition with cachexia

**(II) LARYNX****(I) CONGENITAL:****Laryngocoele**

Def Diverticulum of the larynx

Clinic Painless cystic sacrocele on the anterior or lateral aspect of the larynx, moving on deglutition

**(II) TRAUMA:****(1) FOREIGN BODIES IN THE LARYNX**

Sites (a) Vallecula

(b) Sinus pyriformis

Signs (a) History or no history

(b) Acute obstructive dyspnoea or dysphagia

(c) Laryngeal irritation dry hacking cough

(d) Lung signs obstructive emphysema

(a) Check valve

(b) Ball valve

- Diff. diag (1) Acute laryngitis  
(2) Diphtheria  
(3) Laryngeal spasm
- Compl (1) Recurrent attacks of suffocation  
(2) Edema glottis  
(3) Lung sepsis  
(a) Purulent bronchitis or bronchiectasis  
(b) Septic broncho-pneumonia  
(c) Abscess gangrene or collapse lung  
(d) Empyema
- Treat (1) Direct laryngoscopy (with removal of F B.)  
Ind (a) Examination of larynx  
(b) Removal of impacted foreign body  
(c) Laryngeal obstruction  
Anaesth (a) Dose of atropine  
↓ (b) Anaesthesia  
(a) Nil in children under 3  
(b) General ether  
(c) Local (Pantocain 1%)  
If severe respiratory distress  
(a) Tracheotomy  
↓ (b) General anaesthesia  
↓ (c) Laryngoscopy  
After treat Watch for edema glottis  
(2) Urgent tracheotomy  
(3) Laryngo-fissure

## (2) WOUNDS OF THE AIR PASSAGES

- Eto (1) Incised wounds  
(a) Suicidal high  
(b) Homicidal low  
(c) Operative
- Clinic (1) Emphysema  
(2) Escape of air  
(3) Respiratory distress and aphonia
- Compl (1) Suffocation  
(2) Lung sepsis  
(3) Cervical sepsis  
(4) Necrosis of cartilages
- Treat (1) Suture air-tight  
↓ (2) Drainage of surrounding tissues  
+ (3) Tracheotomy

## (III) INFLAMMATION:

### (A) ACUTE INFLAMMATIONS

- (1) Acute laryngo-tracheo-bronchitis;

Path Descending inflammation of the airways due to infection by streptococcus haemolyticus giving rise to

- (a) Inflammatory oedema of glottis



- ↓ (b) Obstruction to the airways
- ↓ (c) Atelectasis of the lung
- ↓ (d) Cardiac and general exhaustion
- Treat (1) Rest no opiates
- (2) Oxygen inhalations
- (3) Fluids
- (4) Tracheotomy if necessary
- (5) Postural drainage or aspiration or irrigation

## (2) Oedema glottis :

Def Exudation in the submucosa of rima glottis

- Etio (1) Inflammatory
- (a) Burns and scalds of the pharynx
  - (b) Trauma and foreign bodies
  - (c) Acute cellulitis of mouth and neck
- (2) Non-inflammatory :
- (a) Local dropsy
  - (b) Pressure on cervical veins
  - (c) Carcinoma tongue
  - (d) Massive doses of pot. iodide
  - (e) Angio-neurotic oedema

Clinic Urgent dyspnoea

- Treat (1) Intubation of larynx
- Ind Temporary
- (2) Laryngotomy
- Ind Adults
- (3) Tracheotomy
- Ind Children

## (3) Abscesses of the larynx :

- Etio (1) Traumatic: (a) Lacerations
- (b) Foreign bodies
- (2) Ulceration of tumours with secondary infection
- (3) Secondary: (a) Typhoid
- (b) Influenza
  - (c) Septicæmia

Path (1) Oedema

- ↓ (2) Perichondritis
- ↓ (3) Osteomyelitis
- ↓ (4) Abscess

- Clinic (1) Deep pain on pressure and swallowing
- (2) Sensation of foreign body
  - (3) Dyspnoea
  - (4) Hoarseness

Signs: Local

- Treat (A) Arytenoids (a) Unilateral wait
- (b) Bilateral
  - (a) Tracheotomy
  - ↓ (c) Laryngofissure

- ↓ (v) Drainage  
↓ (s) Sequestrotomy
- (B) Thyroid cart. Window resection  
(C) Cricoid cart. Tracheotomy  
↓ Laryngofissure
- (4) Infective perichondritis
- Etiol (1) Oral sepsis  
(2) General low resistance
- Cause (1) Trauma (a) Incised wounds  
(b) High tracheotomy  
(2) Infective Typhoid
- Clinic (a) Pyrexia  
↓ (b) Local pain  
↓ (c) Hoarseness  
↓ (d) Dysphagia  
↓ (e) Dyspnoea  
↓ (f) Tender swelling  
+ (g) Lymphadenitis
- Compl (1) Stenosis or fixation  
(2) Loss of function  
(3) Recurrent laryngeal paralysis
- Treat (1) Conservative  
↓ (2) Low tracheotomy

## (B) CHRONIC AND SPECIFIC INFLAMMATIONS

### (1) Chronic catarrhal laryngitis

Etiol Orators, teachers, preachers

Clinic (1) Dryness of the pharynx  
(2) Tired and hoarse voice

Compl Contact ulcer

Perichondritis of the tip of the vocal process

### (2) Tuberculosis of the larynx

Etiol Pulmonary tuberculosis

Path Infection sputum through the epithelium  
Place vocal process

Clinic (1) Hoarse voice In a patient with phthisis  
↓ (2) Perichondritis:  
With perilaryngeal cold abscess

Signs (1) Isolated redness or swelling on the under surface of a vocal cord  
(2) Swelling and redness of  
(a) Vocal process  
(b) Inter-arytenoid region  
(c) Anterior commissure (rare)  
(3) Characters of lesions  
(a) Numerous  
(b) Superficial

- (c) Mobile cord
- (3) Advanced pulmonary T. B.  
With positive sputum
- Diff diag (1) Catarrhal laryngitis
- (2) Syphilis of the larynx
- (3) Carcinoma larynx
- Treat (1) Silence
- (2) Treatment of pulmonary condition
- (3) Light baths
- (4) Alcohol injection into
  - (a) Superior laryngeal nerve
  - (b) Recurrent laryngeal nerve
- (5) Galvano-cautery
- (6) Conservative surgery
- (3) Syphilis of the larynx
  - (A) Secondary Laryngitis and mucous patches
  - (B) Tertiary
    - (1) Gummatous infiltration
    - ↓ (2) Necrosis
    - ↓ (3) Secondary infection
    - ↓ (4) Abscess
- (4) Laryngeal perichondritis and necrosis
- Etiol (1) Traumatic
- (2) Infective
  - (a) Sepsis
  - (b) Typhoid
- (3) Specific
  - (a) Tuberculosis
  - (b) Syphilis
- (4) Carcinoma
  - Ulceration with secondary infection

#### (IV) NEW GROWTHS:

##### (A) INNOCENT

###### (1) Papilloma

Path Soft, pedunculated warts on the posterior third of the true or false vocal cords

Clinic Hoarseness dyspnoea

Treat Excision through a laryngoscope

###### (2) Fibroma

###### (3) Angioma

###### (4) Lipoma

###### (5) Chondroma

- (6) Cystoma
  - (a) True laryngeal
  - (b) Cervico-laryngeal: brachial

##### (B) MALIGNANT

###### Carcinoma of the larynx

Etiol Age and sex Men of 55

- Predisposers** (a) Scar tissue  
 (b) Vocal abuse  
 (c) Tobacco cigarette  
 (d) Benign growths
- Site** (A) **Intrinsic**  
 (1) **Anterior or middle third of vocal cord**  
     ↓ Anterior commissure  
     ↓ Opposite cord  
     Path Squamous celled  
     Clink Hoarseness  
 (2) **Ventricular band or ventricle**  
     Path Columnar celled  
     Clink Local discomfort  
 (3) **Subglottic** Anterior half
- (B) **Extrinsic**  
 (1) **Epiglottis** (a) Posterior laryngeal  
                   (b) Anterior lingual  
                   (c) Lateral ary-epiglottic  
 (2) **Ary-epiglottic fold**  
 (3) **Pyriform fossa** (a) Floor  
                          (b) Lateral wall
- Path** (1) **Squamous celled carcinoma 95%**  
 (2) Basal celled  
 (3) Columnar celled in ventricular site
- Clink** (A) **Intrinsic**  
 (1) **Early and pronounced** Huskiness  
   ↓ Hoarseness  
   ↓ Aphonia  
   ↓ Dyspnoea  
     ↓ (2) **Late glandular metastases**
- (B) **Extrinsic**  
 (1) **Early and pronounced glands**  
     ↓ (2) **Early dysphagia and late dyspnoea**
- Signs** (1) **Laryngoscopy**  
 (a) Slight immobility of vocal cord  
 (b) Unilateral local congestion  
 (c) Local ulcer  
 (d) Local infiltrating wart  
 (e) Local thickening  
 (f) Nil (in pyriform growths)  
 (2) **Oesophagoscopy**  
 (3) **Biopsy** (A) Primary  
               (B) Glandular metastases

## Diff. diag (A) Intrinsic :

- (1) Chronic laryngitis
- (2) Tuberculosis
- (3) Syphilis
- (4) Innocent tumours
- (5) Keratosis and pachydermia
- (6) Paralysis
- (7) Submucous hæmorrhage

## (B) Extrinsic

All causes of enlargement of cervical glands

- Compl (1) Chest complications  
 (2) Respiratory obstruction

## Treat (A) Intrinsic carcinoma

- (1) Excision of the primary
  - (a) Laryngo-fissure
 

Ind Early one sided growth  
With mobile cord
  - (b) Partial laryngectomy :
    - (a) Anterior
    - (b) Lateral

Ind (1) Growth across ant. commissure  
 (2) Growth in the subglottis
  - (c) Total laryngectomy :
 

Ind (1) Epiglottic extension  
 (2) Arytenoidal extension  
 (3) Subglottic extension  
 (4) Ventricular extension  
 (5) Cartilage extension  
 (6) Fixation of one or both the cords  
 (7) Recurrence after laryngo-fissure

## (2) Radiation

Ind Total laryngectomy contraindicated

- Tech (a) Deep X Rays  
 (b) Radium  
 (a) Surface bomb  
 (b) Interstitial subchondral method

## (B) Extrinsic carcinoma :

- (1) Epiglottis
  - (a) Lateral lat. pharyngotomy & excision
  - (b) Posterior total laryngectomy
  - (c) Anterior excision after mandible split
- (2) Fossa pyriformis
  - (a) Laryngo-pharyngectomy
  - (b) Palliative
    - (a) Gastrostomy
    - (b) Tracheotomy

**(C) Glandular metastases**

- (1) Bilateral excision
- (2) Deep X Ray therapy
- (3) Radium (a) Bomb  
(b) Interstitial

**(V) PARALYSIS OF THE LARYNX:**

**Causes** (1) Goitre (a) Preoperative malignancy  
(b) Post-operative

- (2) Pulmonary T.B.
- (3) Aneurysm
- (4) Carcinoma oesophagus
- (5) Syphilis

**Path** (1) Trauma to pressure on or implication of recurrent laryngeal nerve

- ↓ (2) Vocal cords in (a) Adduction  
(b) Midway cadaveric.

**Clinic** (1) Dyspnoea  
(2) Voice disturbances

**Treat** Tracheotomy

**Ind** Bilateral abductor paralysis

**(III) TRACHEA****(I) FOREIGN BODIES IN TRACHEA**

**Clinic** (1) History or no history  
(2) Recurrent glottic spasms  
(3) Anxious expression and immobility  
(4) Dyspnoea and asthmatic expiratory wheeze

**Sign** Silent tracheotomy

No air enters or leaves the lungs even during artificial respirations after tracheotomy

**Treat** (1) Bronchoscopy

- (a) Oral
- (b) Tracheal

(2) Tracheotomy

**Explore with** (a) Sinus forceps  
(b) Bronchoscope

- Ind** (a) Surgeon not always at hand  
(b) Child under 3 years  
(c) Transport to a distance

**(II) OBSTRUCTION TO THE TRACHEA****(A) Extrinsic:**

- (1) Goitre (a) Non-malignant  
(a) Suprasternal  
(b) Retrosternal  
(b) Malignant

- (2) Aneurysm
- (3) Oesophageal carcinoma
- (4) Enlarged glands
- (5) Mediastinal tumours

(B) *Intrinsic:*

- (1) Diphtheria
- (2) Foreign body
- (3) Syphilis
- (4) Tuberculosis
- (5) New growths sarcoma or carcinoma

(III) *Carcinoma*

Etiol Late middle life in males

Path Squamous

Clinic (1) Retrosternal oppression with dyspnoea  
 (2) Purulent or bloodstained sputum  
 (3) Dysphagia

Comp Lung complications

Treat (1) Excision  
 (2) Radiotherapy

## (IV) OPERATIONS ON PHARYNX, LARYNX AND TRACHEA

(I) OPERATIONS ON THE PHARYNX  
PHARYNGOTOMY

Ind Exposure and treatment of the focus below the level of the palate

Tech (A) *Afedian pharyngotomy*

Ind Growths of the epiglottis and the base of the tongue

(a) *Subhyoid* through the thyrohyoid membrane

Ind Affections of the epiglottis

Tech (1) Incision transverse subhyoid

(2) Division of platysma and prelaryngeal muscles:  
Close to the hyoid(3) Division of thyrohyoid membrane:  
(Spare the superior laryngeal nerve and vessels)

(4) Exposure of the epiglottis

(b) *Transhyoid*: Division of the hyoid(c) *Suprahyoid*:

Ind: Exposure in the region of the base of the tongue

Tech (1) Transverse suprahyoid incision  
From sternomastoid to sternomastoid

(2) Retraction of submaxillary gland

(3) Detachment of myelohyoid muscle

(B) *Lateral pharyngotomy*

Ind (a) Malignancy of pharynx

+ (b) Cervical gland metastases

(a) Superior lateral pharyngotomy:

Ind Growths of (a) *Tonilla*(b) *Faucial pillars*(c) *Base of the tongue*

- Tech** (1) Division of the mandible in front of masseter  
(2) Incision of superior constrictor in front of tonsil
- (5) Interior lateral pharyngotomy:**
- Ind** Growths of (a) Pyriform fossa  
(b) Larynx  
(c) Post-cricoid region
- Tech** (1) Removal of hyoid cornu and thyroid ala  
(2) Division of middle and inferior constrictors
- (c) Combined lateral pharyngotomy**
- Syn** Trotter's laryngo-pharyngotomy
- Steps** (1) Preliminary tracheotomy with intratracheal anaesthesia  
↓ (2) Laryngo-pharyngotomy
- (a) Incision (a) Mid-mento-hyoid to ear  
+ Along the sternomastoid  
or (β) Ear to cricoid along sternomastoid  
+ Lip to cricoid in midline
- (b) Dissection of skin and fascial flaps
- (c) Exposure of anterior and submaxillary triangles
- (d) Crise & resection of cervical tissues
- (e) Division of
- (1) Post. belly of digastric and stylohyoid
- (2) Common facial vein
- (3) Arteries (a) Superior thyroid  
(β) Lingual  
(γ) Facial
- (4) Nerves (a) Superior laryngeal  
(β) Lingual  
(γ) Hypoglossal
- (f) Suture of sternomastoid to prevertebral muscles
- (g) Division of (a) Thyroid muscles
- (1) Inferior constrictor
- (2) Stylopharyngeus
- (β) Hyoid muscles
- (1) Hyoglossus
- (2) Sternohyoid
- (3) Thyrohyoid
- (4) Middle constrictor
- (h) Division of (a) Mandible  
(β) Hyoid cornu  
(γ) Posterior frs of thyroid ala
- (i) Packing and isolation of the wound and protection of laryngeal inlet
- (j) Incision into the whole lateral wall of the pharynx
- (k) Excision of the tumour
- (l) Closure with drainage (Pharyngo-cutaneous fistula)
- er-treat** (1) Feeding tube into the oesophagus  
(2) Tracheotomy tube for 10 days  
(3) Closure of pharyngostoma after 4 weeks



## (II) OPERATIONS ON THE LARYNX:

## (1) Intubation of larynx

Ind Laryngeal obstruction

Advant Avoids operation

Disadv Ulcer cord

Anæsth Spray the nasal passages with 10% cocaine during inspiration

Tech Introduction of No. 12 catheter with stilette curved into C. via (a) Nose  
(b) Mouth

## (2) Infrathyroid laryngotomy:

Def Insertion of a tube through an opening in the crico-thyroid membrane

Ind (A) Only in adults

(B) Emergency Sudden laryngeal obstruction

(a) Foreign body

(b) Edema glottis

(c) Spasm glottis

(d) Bilateral abductor paralysis

(C) Preliminary To operations on

(a) Tongue

(b) Floor of the mouth

(c) Jaw

(d) Pharynx

Position: Extension of neck with head exactly in mid line

Tech (1) Transverse incision over crico-thyroid interval  
(2) Push in a dilator through the crico-thyroid membrane and dilate  
(3) Introduction of tube and its fixation by tapesComp (1) Apnoea  
(2) Hæmorrhage  
(3) Emphysema  
(4) Chronic ulcer  
(5) Stenosis

## (3) Laryngo-fissure:

Def: Splitting the larynx and excision or cauterisation of growths on the vocal cords

Ind (1) Early intrinsic carcinoma with mobile cords

(2) Innocent growths

(3) Foreign bodies

(4) Stenosis

Preoper (1) Treatment of oral sepsis  
(2) Preliminary deep X Rays in malignancy  
(3) Abstinence from alcohol and tobacco

Anæsth: Combined local + general

Position Extension neck with head exactly in midline

- Tech (A) Tracheotomy with pharyngeal plug  
 (a) Incision midline hyoid to suprasternal notch  
 (b) Tracheotomy trans-isthmus  
 (c) Tracheal anaesthesia + pharyngeal plug  
 (B) Exposure of the larynx  
 (a) Exposure of thyroid and cricoid cartilages  
 (b) Ligation of sup. laryngeal artery  
 (On the thyrohyoid membrane)  
 (C) Exposure of the growth  
 (a) Midline split of thyroid perichond. & crico-thyroid mem.  
 (b) Midline split of thyroid cartilage  
 (c) Retraction of laryngeal halves  
 (D) Tracheal plug above the tracheotomy  
 (E) Excision of the growth  
 Excision of the growth with a healthy margin of 1/4 inch  
 (F) Closure of the larynx:  
 (a) Catgut stitches through the perichondrium  
 (b) Sutures upto tracheotomy tube

- After-treat (1) Tracheotomy tube for 6 to 24 hours  
 (2) Nasal feeds for 5 days  
 (3) Sitting posture  
 (4) No morphia: Give bromides and aspirin  
 (5) Use of voice as early as possible

- Post. compl (1) Haemorrhage  
 (2) Emphysema  
 (3) Respiratory infection  
 (4) Cervical cellulitis  
 (5) Mediastinitis  
 (6) Aphonia  
 (7) Recurrence

- (4) Hemilaryngectomy (A) Anterior Tapia  
 (B) Lateral Hautant

Ind Carcinoma larynx limited to one side only

- Tech (1) Hyoid-suprasternum midline incision  
 (2) Tracheotomy with intratracheal anaesthesia  
 (3) Hemilaryngectomy  
 (a) Incision through cartilage on opposite side of the growth  
 (b) Midline incision into cricoid  
 (c) Removal of the affected parts of cartilages  
 (a) Thyroid  
 (b) Cricoid  
 (4) Separation of membranous larynx from cricoid  
 (5) Removal of (a) Growth with healthy margins  
 (b) Vocal process of arytenoid  
 (c) Small piece of opposite cord

(d) Ventricle

(e) Ventricular band

(6) Closure of the wound

## (5) Laryngectomy:

Ind Advanced intrinsic carcinoma

Preoper (1) Mouth and dental care

(2) Respiratory prophylaxis antiscarrin vaccine

Anæsth Local + General intratracheal

Position That of tracheotomy

Tech: (A) Ascending laryngectomy: Perier

(B) Descending laryngectomy: Gluck

(1) Isolation of larynx and ligation of blood-vessels

(a) Incision (a) Transverse sternomastoid to sternomastoid, one inch above the jugulum

(β) Bilateral along the sternomastoids upto hyoid cornu

(γ) Bilateral down and out towards the clavicles

(b) Ligation of veins

(c) Resection of subhyoid muscles

(d) Separation of thyroid isthmus

(e) Ligation of superior thyroid art.

(f) Division of inferior constrictor and stylopharyngeus from the thyroid ala

(g) Ligation of superior laryngeal art. and nerve

(2) Excision of cervical lymph glands

(a) Glands of Poirier under thyroid isthmus

(b) Deep cervical along outer side of int. jug. vein

(3) Separation of larynx from pharynx and œsophagus

(a) Division of thyrohyoid ligament

(b) Epiglottis drawn out

(c) Separation of larynx from pharynx by dissection of pharyngeal muc. membrane off the posterior wall of the larynx

(d) Passage of No. 12 Jacques catheter through the mouth into the upper end of the œsophagus

(e) Interrupted sutures in the pharynx

(4) Amputation of larynx from trachea and formation of tracheo-cutaneous fistula

(a) Division of trachea above the isthmus

(β) Anchor the lower end to the lower margin of incision

(c) Ligation of vessels

(d) Skin-tracheal sutures

(5) Closure and drainage of the wound:

(a) Interrupted sutures

(b) Drainage tubes: three on each side

(c) Cannula tied in tracheal opening



- (6) **Nervous**  
 (a) Bilateral abductor paralysis  
 (b) Laryngeal spasm or stridor
- (7) **Therapeutic:**  
 (a) Preliminary to operations on  
     (a) Oral cavity  
     (b) Pharynx and larynx  
     (c) Chest  
 (b) Endotracheal or endobronchial therapeutics
- Anæsth** (1) Nil in children and urgency  
 (2) **Local** Novocain infiltration  
 (3) **General** in young children
- Position.** (1) Extension of the neck  
               : Chin and episternum in one plane  
 (2) Head exactly in midline  
 (3) Sandbag beneath the shoulders
- Tubes** (1) Bivalve (a) Inner  
                       (b) Outer  
 (2) Durham lobster tailed  
 (3) Parker's angulated
- Sizes** (a) English 1 to 8  
 (b) French 18 to 32
- Ind** (1) Children under 2   Eng No. 2   Fr No. 20  
 (2) 2 to 4 years           Eng No. 3   Fr No. 22  
 (3) Over 4 years          Eng No. 4   Fr No. 24  
 (4) Adults               Eng. No. 5 or 6   Fr Nos. 26-28.
- Tech** (A) **Cricotracheotomy**  
       **Ind** Temporary and urgent measure  
       **Site** Lower border of cricoid  
       **Contraind** Tube not well borne  
       (B) **High supra-isthmus tracheotomy:**  
       **Ind** (1) Extreme urgency  
             (2) Children  
             (3) Obese short neck  
             (4) Lower part inaccessible.
- Tech** (1) Median vertical incision  
       (a) Skin  
       (b) Subcutaneous tissues  
       (c) Deep cervical fascia  
 (2) Exposure of trachea between  
       (a) Cricoid  
       & (b) Isthmus  
 (3) Steady the cricoid with a hook  
 (4) Stab and introduce the dilator between  
       (a) Cricoid  
       & (b) Isthmus  
 (5) Introduction of cannula

**(C) Median trans-isthmus tracheotomy Digby**

- Ind (1) Easy introduction of tube  
 (2) No hæmorrhage
- Tech (1) Midline incision 1.5 from upper border of the cricoid downwards  
 (2) Exposure of the cricoid  
 (3) Transverse incision of the fascia attached to the lower border of the cricoid  
 (4) Passage of a hæmostat behind the isthmus  
 (5) Division of the isthmus between two clamps  
 (6) Exposure of the first four rings of the trachea beneath the isthmus  
 (7) Tranquil tracheotomy of St. Clair Thomson  
 Injection of 2.5% cocaine in the trachea  
 20 minims in adults  
 5 minims in children  
 (8) Vertical incision through 2, 3 & 4th rings  
 (9) Excision of margins to form an oval window  
 (10) Insertion of tracheotomy tube  
 (11) Approximation of the skin around the tube

**(D) Low infra-isthmus tracheotomy:**

- Tech (1) Incision down to suprasternal notch  
 (2) Exposure of isthmus  
 (3) Dissection and exposure of trachea  
 (4) Open the trachea from below upwards

**(E) Urgent tracheotomy**

- Tech (1) Skin incision 3 down from cricoid  
 (2) Lift up the larynx by hook under cricoid  
 (3) Stab the trachea 5 below the cricoid  
 (4) Introduce hæmostat along the blade  
 (5) Open the hæmostat  
 (6) Insert the tracheotomy tube  
 (7) Remove the hook

**After treat**

- (1) Double-folded gauze apron moistened with water over the mouth of the tube  
 (2) Cleansing and reintroduction of inner tube  
 (a) Feather introduction  
 (b) Soda-bi-carb sol. spray  
 (c) Soda sol. wash  
 (3) Steam inhalations  
 (4) Replacement of metal tube by Morratt Baker's rubber tube

**After 4 days**

- (5) Omission of the tube as early as possible

**Post. compl**

- (1) Shock and collapse  
 (2) Hæmorrhage  
 (3) Respiratory failure give  $\text{Co}_2$

- (4) Displacement of tube :
  - (a) Manual
  - (b) Cough
- (5) Emphysema
- (6) Cervical cellulitis → mediastinitis
- (7) Bronchitis → bronchopneumonia
- (8) Sloughing → ulceration → stenosis
- (9) Necrosis of trachea
- (10) Extension of disease downwards

## (V) IMPORTANT POINTS

### (I) PHARYNX

#### (A) Trauma :

- (1) Escape of saliva is the pathognomonic sign of trauma to the pharynx.

#### (B) Infection

##### (2) Retropharyngeal abscess

- (1) Acute between pharynx and prevertebral fascia
- (2) Chronic
  - (a) Behind prevertebral fascia T B. spine
  - (b) Behind pharyngeal wall T B. glands.

##### (3) Retropharyngeal abscess

- (1) *Acute open through the mouth*
- (2) *Chronic open via the neck.*

- (4) Do not allow the pus under tension flood the pharynx when opening the acute retropharyngeal abscess use small incision with suction apparatus or aspirate before incision

##### (5) Abscesses in the pharynx

- (a) Peritonsillar abscess
- (b) Paratonsillar abscess
- (c) Parapharyngeal abscess
- (d) Retropharyngeal abscess
  - (a) Acute
  - (b) Chronic.

#### (C) New growths

##### (6) Sites for new growths of the pharynx

- (a) Nasopharynx
- (b) Oropharynx
- (c) Epilarynx
- (d) Hypopharynx.

- (7) Malignant growths of the posterior third of the tongue are highly malignant while growths of the fauces tonsils and palate are not so malignant.

- (8) In carcinoma of the oropharynx, neck should be left alone if there are no palpable glands and the patient should be kept under close and repeated observations.
- (9) Excision by diathermy knife is very effective in early carcinoma of
- (a) The fauces
  - (b) Palate
  - (c) Tonsils
  - (d) Posterior pharyngeal wall
  - (e) Base of the tongue.
- (10) *Post-cricoid carcinoma is frequent in young females while pharyngeal diverticulum is more common in middle aged males.*
- (11) In cases of post-cricoid carcinoma, severe dysphagia and more than moderate enlargement of cervical glands denote inoperability of the growth.
- (12) Lympho-sarcomata and squamous carcinomata are the most common malignant tumours of the pharynx.
- (13) *Enlarged cervical glands may be the first sign of malignancy of the pharynx.*
- (14) Summary of diathermy of oropharyngeal tumours
- (1) Group I Small growths without glands  
Treat Diathermy excision or coagulation
  - (2) Group II Large growths without glands  
Treat (a) Primary block dissection  
+ Ligation of ext. carotid art.  
↓ (b) Diathermy
  - (3) Group III Extensive growths with or without glands  
Treat (a) Primary block dissection  
+ Ligation of ext. carotid art.  
↓ (b) Removal of half the jaw  
+ Diathermy
  - (4) Group IV Doubtful malignancy  
Treat (a) Biopsy  
↓ (b) Diathermy radium or X Rays.

#### (D) Operations

- (15) Do not forget to exclude cervical cellular tissues at the time of pharyngeal incision by *suture of sterno-mastoid to prevertebral muscles* and by *packing*.

### (II) LARYNX

#### (A) Trauma

- (16) Do not forget sinus pyriformis and valecula while searching for foreign bodies in larynx.



- (4) Displacement of tube
  - (a) Manual
  - (b) Cough
- (5) Emphysema
- (6) Cervical cellulitis → mediastinitis
- (7) Bronchitis → bronchopneumonia
- (8) Sloughing → ulceration → stenosis
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  - (c) Tonsils
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Treat (a) Primary block dissection  
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+ Diathermy
  - (4) Group IV Doubtful malignancy  
Treat (a) Biopsy  
↓ (b) Diathermy radium or X Rays.

#### (D) Operations

- (15) Do not forget to exclude cervical cellular tissues at the time of pharyngeal incision by suture of *sternomastoid to prevertebral muscles* and by packing.

## (II) LARYNX:

### (A) Trauma

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Treat (a) Primary block dissection  
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+ Diathermy
  - (4) Group IV Doubtful malignancy  
Treat (a) Biopsy  
↓ (b) Diathermy radium or X Rays.

#### (D) Operations

- (15) Do not forget to exclude cervical cellular tissues at the time of pharyngeal incision by suture of *sternomastoid to prevertebral muscles* and by packing.

## (II) LARYNX

### (A) Trauma

- (16) Do not forget *anrus pyriformis* and *valecula* while searching for foreign bodies in larynx.

- (17) Always keep a watch for oedema glottis in a  
scalds of the pharynx
- (B) Infection
- (18) Causes of oedema glottis
- (1) Scalds of the pharynx
  - (2) Oral submaxillary and cervical infection
- (19) In doubtful cases of laryngitis, try antisyph  
measures.
- (20) Nearly all cases of tuberculous laryngitis are a  
ary to phthisis.
- (21) In T. B. patients, catarrhal laryngitis is tuber  
unless proved otherwise.
- (C) Carcinoma larynx
- (22) Carcinoma larynx occurs in males between 50  
in 90% of cases.
- (23) Carcinoma larynx
- |        |  |              |
|--------|--|--------------|
| Types  | (a) Intrinsic                          |              |
|        | (b) Extrinsic                          |              |
| Path   | Squamous carcinoma                     |              |
| Clinic | (a) Hoarseness → aphonia               | } Intrinsic. |
|        | (b) Dyspnoea                           |              |
|        | (c) Dysphagia                          | } Extrinsic  |
|        | (d) Enlarged cervical glands           |              |
| Compl  | Chest affections                       |              |
| Treat  | (A) Intrinsic                          |              |
|        | (a) Mobile cord laryngo-fissure        |              |
|        | (b) Fixed cord laryngectomy or radial  |              |
|        | (c) Subglottic laryngectomy            |              |
|        | (d) Anterior commissure laryngectomy   |              |
|        | (B) Extrinsic                          |              |
|        | (a) Epiglottis lateral pharyngotomy    |              |
|        | (b) Aryepiglottic lateral pharyngotomy |              |
|        | (c) Post-cricoid lateral pharyngotomy  |              |
|        | (d) Pyriform pharyngo-laryngectomy     |              |



- (40) Procedures in secondary glands of carcinoma larynx :  
 (1) Block dissection low malignancy  
 (2) Irradiation high malignancy
- (41) Radium needles after subperichondrial removal of the cartilage is good for intrinsic carcinoma. Deep X Rays are better for extrinsic carcinoma.

### 3) Operations

- (42) *Laryngotomy with intubation is suitable only for adults and for cases where there is no need to keep the tube for more than 48 hours.*
- (43) A cyanosed and asphyxiated patient can be relieved by laryngotomy more readily than by any other method.
- (44) Fixation of the cord a contraindication for laryngofissure.
- (45) Enlargement of cervical glands is not a contraindication for laryngectomy except where they are so fixed as to necessitate removal of common carotid artery
- (46) If a preliminary tracheotomy is done for laryngectomy it shall be a low one.
- (47) Laryngectomy operations
- (1) One stage
    - (a) Ascending Perier
    - (b) Descending Gluck
  - (2) Preliminary tracheotomy  
 ↓ One stage laryngectomy
  - (3) Two stage Crile
    - (a) Exposure of trachea and larynx  
 ↓ Tracheotomy  
 ↓ Iodoform gauze isolation  
 ↓ (b) Laryngectomy
  - (4) Multiple stage
    - (a) Isolation of larynx and trachea  
 ↓ (b) Tracheotomy  
 ↓ (c) Laryngectomy
- (48) Steps of laryngectomy
- (1) Tracheotomy
  - (2) Isolation of larynx and ligation of vessels
  - (3) Excision of lymph glands
  - (4) Separation of larynx from
    - (a) Pharynx
    - (b) Oesophagus
  - (5) Closure of the pharynx
  - (6) Separation of larynx from trachea
  - (7) Suture of trachea to the skin
  - (8) Closure and drainage of the wound.

- (49) In laryngectomy prevent retraction of cut lower end of the trachea into the thorax by preventive anchoring before its division across. Do not cut the whole circumference till the anterior half is anchored. Do not tie the anchor sutures too tightly

(F) Miscellaneous

- (50) Most common cause of post-operative bilateral abductor paralysis is traction on the recurrent laryngeal nerves during thyroidectomy
- (51) If laryngeal paralysis lasts for more than 12 months, there is little hope of recovery

(III) TRACHEA

(A) Trauma

- (52) Foreign body passing the cricoid will not completely obstruct the trachea.
- (53) After tracheotomy for foreign body in the trachea, search for it as soon as possible even when it is said to have been removed.
- (54) *All is not asthma that wheezes* (Chevalier Jackson).
- (55) *Silent tracheotomy is the cardinal sign of impacted foreign body in the trachea*

(B) Operations Tracheotomy

(56) Indications

- (1) Tracheotomy
  - (a) Children
  - (b) Obstruction taking time
- (2) Laryngotomy
  - (a) Adults
  - (b) Obstruction of not more than 48 hours.

*Chief indications*

- (a) *Diphtheria*
  - (b) *Acute oedema glottis*
  - (c) *Preoperative*
  - (d) *Foreign bodies.*
- (57) Tracheotomy is the operation for private practice  
intubation is the operation for hospital practice  
as the attending nurse can do something in accidental removal of tube in tracheotomy but nothing in intubation.
- (58) *Main indication of tracheotomy is diphtheria*
- (59) *The two emergency measures to be considered in dyspnoea due to obstruction are*
- (a) *Tracheotomy for children*
  - (b) *Laryngotomy for adults.*



- (60) *Any patient with sufficient obstruction to cause audible stridor on exertion is in the danger zone. If stridor is noticeable when resting tracheotomy should be considered. If it is audible when he is asleep tracheotomy is urgently needed.*
- (61) *Tracheotomy is no good for obstruction in thoracic trachea. Retrosternal goitre.*
- (62) *Important points in tracheotomy*
  - (1) *No deviation or rotation of head*
  - (2) *Extension of neck*  
Chin and episternum in one plane
  - (3) *Incision exactly in midline*
  - (4) *Cricoid hook not to be removed till tube is in*
  - (5) *Tranquil tracheotomy*
- (63) *Low tracheotomy is difficult in adults as it is deep. It is dangerous in children as left innominate vein may intervene.*
- (64) *Special points in tracheotomy for diphtheria*
  - (1) *Every one to wear mask*
  - (2) *Cover the wound as soon as trachea is opened*
  - (3) *Find out whether membrane has extended beyond tracheal stoma*
  - (4) *Antidiphtheritic serum for every contact.*
- (65) *Tracheotomy set and intubation instruments must be kept ready by the bedside of a diphtheritic patient at all times.*
- (66) *Outer tracheotomy tube should not be removed for at least 4 days.*
- (67) *Accidental removal of the tube and blocking of the tube should be guarded against in the after treatment of tracheotomy*

#### (IV) MISCELLANEOUS

- (68) *Respiratory obstruction and aspiration are the most important factors in the production of respiratory complications after operations.*
- (69) *Ether and gas are to be avoided in every case of real or potential asphyxia.*
- (70) *No operation upon the respiratory tract should be undertaken unless a tracheotomy set is ready at hand*
- (71) *Laryngotomy tube is oval on cross section while tracheotomy tube is round.*
- (72) *In novocain injection of deep nervous plexuses, make certain that the needle is not in a blood vessel by aspirating just before injection.*

- (73) In laryngeal and pharyngeal operations, contact of mucous and saliva with the raw surfaces produces inflammatory complications local respiratory and general
  - (74) *Basal anæsthesia should be avoided in operations on larynx or pharynx.*
  - (75) *Atropine is of great value in operations on parts with mucous or salivary exudation as a preanæsthetic medication.*
  - (76) Never make a direct communication between the cervical tissues and the oral or pharyngeal cavity
  - (77) Laryngeal cartilages have poorer powers of repair than most cartilages in the adults it always unites by fibrous tissue.
  - (78) *When mucous membrane is to be joined to the skin use silk as silkworm-gut tears the mucous membrane and catgut necroses the skin.*
-

## CHAPTER II

# THE BRONCHI AND THE LUNGS

## THE BRONCHI

### (I) TRAUMA:

#### FOREIGN BODIES IN THE BRONCHI

Clinic	(1)	History or no history
	(2)	Cough + local pain + rales small f. b.
	↓ (3)	Asthmatic wheeze on expiration larger f. b.
	↓ (4)	Emphysema lung still larger f. b.
	↓ (5)	Collapse or atelectasis lung largest f. b.
Signs	(1)	X Ray
	(2)	Diagnostic bronchoscopy
		(a) High oral (b) Low tracheal
Diff. diag	(1)	Asthma
	(2)	Bronchiectasis
	(3)	Abscess lung
	(4)	F. B. in oesophagus
Compl	(1)	Suffocation
	(2)	Broncho-pneumonia
	(3)	Emphysema
	(4)	Collapse
	(5)	Abscess or gangrene lung
	(6)	Bronchiectasis
Treat		Bronchoscopic extraction:
	(a)	Without tracheotomy
	(b)	With tracheotomy

### (II) INFLAMMATION:

#### (1) ACUTE TRACHEO-BRONCHITIS:

##### (A) Catarrhal bronchitis: Post-operative

Etiology	(a)	Pre-operative bronchitis
	(b)	Exposure
	(c)	Ether anaesthesia
Onset		Within 48 hours of anaesthesia
Clinic	(a)	Cough (dry → wet) with dyspnoea
	(b)	Physical signs
	(c)	General toxæmia
Treat	(1)	Deep breathing every hour or two
	(2)	Steam inhalations with
		(a) Creosote (b) Tr. benzoin co.



<b>Etiology</b>	(a) Children congenital (b) Adults acquired
<b>Causes</b>	(A) <b>Acute</b> (a) Unresolved broncho & lobar pneumonia (b) Inhalation of foreign body (c) Acute bronchitis (B) <b>Chronic</b> (a) Congenital abnormality of bronchial tree (b) Bronchial affections (1) Pressure from without (2) Obstruction to lumen (c) Atelectasis of the lung (d) Chronic affections of the lung
<b>Path. varieties</b>	(1) <b>Congenital or cystic juvenile</b> (a) Single (b) Multiple (c) Honeycomb (2) <b>Acquired or adult</b> (a) Cylindrical type dilated bronchi (b) Fibrotic type fibrosed bronchi (c) Saccular type cavities + ulcers
<b>Site</b>	(a) Local basal (b) Whole one side (c) Bilateral
<b>Clinic</b>	(1) Intermittent cough with inoffensive or foetid expectoration: Varying on posture (2) Signs of wet consolidation of lung (3) General chronic toxæmia (4) Clubbing of fingers
<b>Signs</b>	(A) <b>X Ray:</b> (a) Ordinary Radiating dense shadows (b) Lipoid! Glove-like fingers blobs Tech 15-40 c.ca. (1) Crico-thyroid route (2) Supra-glottic route (B) <b>Sputum examination</b> Elastic tissue
<b>Diff. diag</b>	(1) Other chronic bronchial affections (2) Chronic lung affections, esp. T B.
<b>Comp</b>	(1) Pneumonia (2) Cerebral abscess (3) Chronic toxæmia → Amyloid disease
<b>Treat</b>	(A) <b>Conservative</b> (a) Antiseptic inhalations and expectorants (b) Vaccines (c) N. A. B. injections

**(B) Drainage****(a) Postural drainage**

The position depends on the lobe affected and must be maintained for at least 22 out of 24 hrs. of the day till expectoration ceases

**(b) Bronchoscopic aspiration****(C) Collapse therapy****(a) Phrenic avulsion** For hæmoptysis**(b) Artificial pneumothorax****(c) Oleothorax****(d) Thoracoplasty****(a) Sauerbruch** posterior resection**(β) Wilms** posterior & anterior resection**(γ) Brauer** whole resection**(D) Excision of the diseased lobe****Lobectomy****(a) Operative****(b) Cautery** Graham**(c) Deliverance** Whittemore

Pre-operative (1) Conservative and postural measures  
To reduce toxæmia

(2) Attention to oropharynx

(3) Good X Ray plates

**(3) BRONCHIAL FISTULA**

Etio (1) Empyema

(2) Lung abscess

(3) Bronchiectasia

(4) Foreign body with infection

Diag (a) Injection of methylene blue into the sinus

↓ (b) Appearance in sputum

Treat (1) Cauterisation

(2) Excision of the tract and closure

**(III) NEW GROWTHS:**

BRONCHIAL CARCINOMA (See under Lung)

**THE LUNGS****(I) CONGENITAL AFFECTIONS:**

Polycystic or congenital cystic disease

(See under Cysts of Lung)

**(II) TRAUMA:****WOUNDS OF THE LUNG**

Etio (a) Crush injuries secondary to fracture rib

(b) Penetrating injuries stab wounds

(c) Gunshot injuries

Clinic	(1) Shock
	(2) Pain
	(3) Dyspnoea
	(4) Hæmoptysis
	(5) Surgical emphysema
Signs	(1) Immobility
	(2) Moist rales
	(3) Consolidation
	(4) Pyrexia
Compl	(1) Pneumothorax
	(a) Closed
	(b) Open
	(c) Valvular
	(2) Hæmothorax
	(3) Empyema
	(4) Pneumonia
Treat	Debridement, sterilisation and air tight closure;
Ind	(1) Open pneumothorax
	(2) Stove in chest with lacerated pleura
	(3) Penetrating wound with
	(a) Progressive bleeding
	(b) Hæmoptysis
	(c) Hæmothorax
	(d) Retained missile
	(e) Massive pneumonia
	(4) Potential Sepsis in pleura or lung
Tech	(1) Debridement and sterilisation of wound
	(2) Immediate air tight suture
	(3) Strapping of the chest
Post-oper treat	(1) Sedatives
	(2) Respiratory antiseptics
	(3) Anti tetanus and anti-gas-gangrene
	(4) Chemotherapy sulphonamides

### (III) POST-OPERATIVE LUNG CONDITIONS:

#### (1) HYPOSTATIC PNEUMONIA

Def Basal congestion → pneumonic consolidation;  
Due to deficient aeration and postural gravity

- Etio (1) Fat, debility and exposure  
(2) Pre-existing chest disease  
(3) Respiratory muscle paresis:  
(a) Upper abdominal operations  
(b) General exhaustion  
(4) Constant supine position

Cause Deficient aeration of the lung bases

Clinic Basal signs of bronchitis → pneumonia

## Treat (A) Prophylactic:

- (1) Choice of anaesthesia avoid eth
- (2) Anticatharrhal vaccine
- (3) Frequent changes in posture
- (4) Co<sub>2</sub> inhalations or deep br
- (5) Stupes to the chest
- (6) Camphor in oil injections

## (B) Curative:

- (1) Expectorants
- (2) M & B 693

## (2) POST OPERATIVE PNEUMONIA

- Eti (1) Worsening of pre-operative condition  
 (2) Hypostatic pneumonia deficient aeration  
 (3) Aspiration pneumonia septic aspiration  
 (4) Septicæmic pneumonia blood infection  
 (5) Exposure pneumonia bad weather + shock  
 (6) Anaesthetic pneumonia ether irritation  
 (7) Secondary pneumonia to atelectasis etc.  
 (8) Infarction pneumonia primary thrombosis

## Varieties (A) Pneumococcal lobar pneumonia

Eti Rare

Cause Antecedent respiratory catarrh

## (B) Broncho-pneumonia

- (1) Primary severe abrupt and early
- (2) Secondary later and milder

## Clinic (1) Primary

- |                               |      |
|-------------------------------|------|
| (a) Respiratory embarrassment | } ++ |
| (b) Local signs               |      |
| (c) General toxæmia           |      |

## (2) Secondary All signs milder

- Diagnosis (1) Severe toxæmia  
 (2) Higher temperature  
 (3) Greater respiratory distress  
 (4) Sputum purulent and bloodstained

- Compl (1) Pulmonary abscess  
 (2) Diffuse septic pneumonitis  
 (3) Pulmonary gangrene  
 (4) Empyema or pyopneumothorax

## (C) Septic aspiration pneumonia:

- Eti (1) Operations on  
 (a) Oral cavity  
 (b) Upper respiratory passages  
 (c) Alimentary obstruction



(2) Disappearance of cough reflex

(3) Sitting posture

Path Aspiration of

(a) Blood

(b) Pus

(c) Vomit

(d) Foreign body

Preventive treat (1) Posture Head lower than the trunk

(a) Trendelenburg

(b) Rose

(c) Reversed

(2) Endotracheal anæsth. + pharyngeal plug

(3) Keep up the cough reflex

(4) Avoid cyanosis

*Treatment of post operative pneumonia in general*

(1) Treat the preoperative chest condition

(2) Avoidance of exposure

(3) Gastric washes and care of the respiratory passages

(4) Early treatment of septicæmia and septic foci

(5) Avoidance of general (especially ether) anæsthesia

(6) Abundant fluids by mouth and rectum

(7) Careful venoclysis

(8) Prophylactic treatment (See above)

(9) Curative treatment

(a) Sitting and changing posture

(b) Oxygen with  $\text{CO}_2$ 

(c) Stimulant expectorants

↓ (d) Pulmonary antiseptics camphor M &amp; D 693

(e) Heart supporters

(10) Injection therapy

(a) Digitalin  $\frac{1}{2}$  gr 8 hourly(b) Atropine sulph  $\frac{1}{16}$  grStrychnine  $\frac{1}{4}$  gr

Adrenaline 5-10 min

} 6 hourly

(c) Pituitrin  $\frac{1}{2}$ -1 cc.

(d) Camphor in oil

(e) Coramine

(f) Caffeine sodium benzoate

(g) Strophanthin  $\frac{1}{16}$  gr B. D

(h) Glucose intravenous

## (3) ACUTE ŒDEMA OF THE LUNGS

Etiol (a) Chest condition

+ (b) Ether anæsthesia

+ (c) Intravenous hydrotherapy

- Clinic (1) Rapid onset and course  
 (2) Oppression pallor dyspnoea  
 (3) Frothy abundant expectoration  
 From nose & mouth  
 (4) Pneumonic consolidation with moist sounds

- Treat (A) Prophylactic  
 (a) Pre-operative atropine  
 (b) Treat pre-operative chest condition  
 (c) Avoidance of ether  
 (d) Careful intravenous hydrotherapy  
 (e) Post-operative prophylaxis  
 (B) Curative  
 (a) Morphia  $\frac{1}{2}$  gr + atropine  $\frac{1}{100}$  gr.  
 (b) Venesection 500-800 c.ca.  
 (c) Medicinal:  
 (a) Onabain  
 (b) Theobromine  
 (r) Digitalin

#### (4) PULMONARY COLLAPSE

Etio Surgical operations with any anaesthesia

- Path. factors (1) Inhibition of cough reflex  
 (2) Inhibition of respiratory musculature:  
 (a) Abdominal muscles  
 (b) Diaphragm  
 (c) Inspiratory muscles  
 (d) Accessory respiratory muscles  
 (3) Bronchial obstruction Due to  
 (a) Secretion ether anaesthesia  
 (b) Oedema  
 (c) Spasm  
 (4) Septic aspiration  
 From oral or pharyngeal cavity  
 (5) Open operation or trauma

- Morb. anat (a) Plug of mucus  
 + (b) Spasm of bronchus  
 + (c) Oedema of bronchial muc. mem.  
 ↓ (d) Bronchial obstruction  
 ↓ (e) Absorption of alveolar air  
 ↓ (f) Collapse of the lung

Varieties (A) Partial basal

Onset Within a few hours

- Clinic (1) Mechanical resp embarrassment  
 (a) Dyspnoea  
 (b) Cyanosis  
 (c) Moist unproductive cough  
 (2) Signs of consolidation  
 (3) Signs of displaced heart

**(B) Pulmonary : Heart and respiratory crisis**

- (a) Precordial pain
- (b) Dyspnoea
- (c) Cyanosis
- (d) Shock
- (e) Unconsciousness

**(C) Lungs Infarction pneumonia**

- (a) Respiratory pain
- (b) Dyspnoea
- (c) Cyanosis
- (d) Hæmoptysis
- (e) Consolidation of lungs

- Diff diag**
- (1) Acute heart failure
  - (2) Coronary embolus
  - (3) Acute internal hæmorrhage
  - (4) Cerebral hæmorrhage
  - (5) Pneumonia

**Treat (A) Prophylactic**

- (1) Anticoagulant  
Sod. citras grs. xxx T D S.
- (2) Pre-operative
  - (a) Avoidance of dehydration
  - (b) Avoidance of protein food
- (3) Operative :
  - (a) Avoidance of rough handling
  - (b) Avoidance of hæmorrhage
- (4) Post-operative :
  - (a) Avoidance of dehydration
  - (b) Avoidance of protein food
  - (c) Avoidance of stagnation by
    - (a) Deep breathing
    - (b) Movements of extremities
  - (d) Complete immobilisation of part containing primary thrombus for three weeks

**(B) Curative :**

- (1) Conservative
  - (a) Oxygen in sitting posture
  - (b) Morphine + atropine
  - (c) Amyl nitrite
  - (d) Venesection
  - (e) Stimulant injections
- (2) Operative :
  - : Trendelenburg's pulm. embolectomy
  - Ind Pulmonary artery embolus
  - ↓ Unconsciousness + absent heart beat
  - (Heart and respiratory crisis)

Tech (See under Operations on Heart)

## (6) PULMONARY SUPPURATIONS

(See under next heading)

*General etiology of post-operative chest complications*

Frequency 10% of all laparotomies

- Pre-disp (1) Age Extremes  
(2) Previous chest disease  
(3) Obese males  
(4) Nature of operations

- Sites (a) Abdominal  
(b) Respiratory passages

- Factors (1) Long duration  
(2) Rough handling  
(3) Much hæmorrhage  
(4) Sepsis

(5) Anaesthesia

(5) Pre and post operative treatment

Factors (1) Impaired respiratory expansion

(A) Avoid

- (a) Trauma to diaphragm  
(b) Respiratory depressants  
Morphia, heroin  
(c) Mechanical constriction  
(a) Abnormal posture  
(b) Tight bandage

(B) Give

- (a) Atropine 1/100 gr  
Expectorants  
Respiratory antiseptics  
Pot. iodide  
(b) Fowler's sitting posture  
Frequent changes in posture  
(c) Breathing exercises:  
C<sub>o</sub>2 inhalations  
(d) Massage and movements of limbs

(2) Pre-existing infection: oral, throat, chest

(A) Treat any pre-existing infections

(B) Postpone the operation if

- (a) Active infection  
(b) Bad weather

(3) Chill and exposure

(A) Maintenance of body heat

During and after the operation

(B) Warm packs to body and viscera

(4) Septic aspiration

- (A) Operate under anaesthesia
  - (a) Local or regional
  - (b) General sodium evipan
- (B) Reversed posture
- (C) Preserve the cough reflex
- (D) Avoid respiratory aspiration
  - By Gastric aspiration
  - Pharyngeal plug
- (5) Inadequate circulation & body fluids
  - (A) Treat inadequacy
    - (a) Avoid shock and collapse
    - (b) Avoid thrombosis and embolism
  - (B) Prevent hyper-adequacy
    - Avoid large venous infusions in cases with probabilities of
      - (a) Oedema of the lungs
      - (b) Failure of the heart

#### *Prophylaxis of post-operative chest complications*

In all operations on

- (a) Nose
- (b) Nasal sinuses
- (c) Mouth cavity
- (d) Pharynx
- (e) Upper respiratory passages
- (1) Take systematic care of nasal and oral hygiene
- (2) Under any anaesthesia, take care of haemostasis
- (3) Careful aseptic and delicate handling
- (4) Prevention of respiratory aspiration
- (5) Post-operative
  - (a) Frequent postural changes
  - (b) Pulmonary gymnastics
  - (c) Encouragement of cough
  - (d) CO<sub>2</sub> inhalations
  - (e) Respiratory antiseptics
  - (f) Stimulant injections
  - (g) Balanced hydrotherapy
  - (h) Protection from exposure

#### (IV) PULMONARY SUPPURATIONS:

##### (1) DIFFUSE PULMONARY PNEUMONITIS:

Etiol Post-operative

Path (a) Bronchial obstruction + infection

↓ (b) Multiple small abscesses

Clinic: Signs of broncho-pneumonia

Diff. diag Broncho-pneumonia

Treat Of broncho-pneumonia

## (2) ABSCESS OF THE LUNG

**Def** Infective gangrene of a segment of the lung leading to formation of an abscess cavity containing foul pus and sloughs and surrounded by an area of pneumonia.

**Etio** (1) **Upper air passages** Aspiration from

(a) Gingivo-dental sepsis

(b) Accidental sepsis

(c) **Post-operative**

(a) **Aspiration** (1) Blood

(2) Pus

(3) Vomit

(4) F B

(β) Embolic

(γ) Lymphatic extension

(2) **Bronchi**: Putrid bronchitis

Bronchiectasis

(3) **Lungs**

Pneumonia, infarction collapse growth

(4) **Pleura** Empyema

(5) **Embolic**

Primary thrombotic or septic focus

(6) **Traumatic**

**Etio. class** (1) **Post-pneumonic**

(2) **Post-operative**

(a) Tonsillectomy

(b) Dental extraction

(3) **Aspiration**: Of f. b. or septic material

(4) **Pyæmic**

(5) **Carcinoma lung**

(6) **Secondary** Rupture of liver abscess

**Site** Periphery of right lower lobe

**Path. class** { (1) Unilocular  
(2) Multilocular

{ (A) Hilar

{ (B) Central

{ (C) Peripheral

{ (D) Lobar

{ (a) Open (α) Bronchus

{ (β) Pleura

{ (b) Closed

**Bact** (1) **Streptococcus**

(2) **Pneumococcus**

(3) **Staphylococcus**

(4) **B. influenzae**

(5) **Spirochaeta**

- Morb. anat**
- (1) **Cavity** Containing disintegrated lung tissue
  - (2) Surrounding zone of consolidation
  - (3) Peripheral zone of normal lung
- : Diffuse widespread gangrene to small localised fibrous-walled chronic abscess**
- Clinic**
- (1) **History** Of one of the etiological factors
  - (2) **General septic toxæmia**
  - (3) **Lung symptoms** 10th to 14th day
    - (a) **Cough**
      - (α) Enormous quantity of pus
      - (β) Hæmoptysis
      - (γ) Fœtid sputum Three layers
        - (1) Froth
        - ↓ (2) Turbidity
        - ↓ (3) Pus
    - (b) **Dyspnoea**
    - (c) **Pain in chest**
  - (4) **Physical signs of lung**
    - (a) Consolidation
    - ↓ (b) Cavitation
- Clinical types**
- (A) **Unperforated or closed**  
: Vague signs
  - (B) **Perforated or open**
    - (a) Acute course
    - (b) Severe toxæmia
    - (c) Empyema or pyopneumothorax
- Special signs**
- (1) **X Rays**
    - (A) **Ordinary** Nature of shadows
      - (1) Well defined in a clear field  
Chronic abscess
      - (2) Dark → opacity → normal  
Subacute abscess
      - (3) Diffuse irregular opacity  
Acute abscess
      - (4) Widespread irregularly dense  
Bronchiectasis
      - (5) Dense homogeneous with irregular margins  
Diffuse pneumonitis
    - (B) **Lipoidol Bronchography**
      - (1) Failure of lipoidol to reach the site of lesion
      - (2) Entry of lipoidol into the cavity with horizontal fluid level
    - (C) **Tomograph**

- (2) **Microscope**  
 (a) **Sputum** Shreds of lung tissue  
                   Elastic fibres  
 (b) **Blood** leucocytosis
- (3) **Bronchoscopy**
- Diff diag (1) **Bronchi** Purulent bronchitis  
                   Bronchiectasis
- (2) **Lungs** Pneumonia  
                   Gangrene  
                   Tuberculosis  
                   New growth
- (3) **Pleura** Interlobar empyema
- (4) **Neighbours**  
                   Rupture of hepatic abscess into the lung
- Comp! (1) **Lung** Broncho-pneumonia  
                   Gangrene  
                   Hæmorrhage, hæmoptysis
- (2) **Bronchi** Bronchiectasis  
                   Bronchial fistula
- (3) **Pleura** Pleurisy  
                   Pyopneumothorax  
                   Empyema
- (4) **Pericardium** Suppurative pericarditis
- (5) **General** Toxæmia  
                   Amyloid disease
- (6) **Special**  
 (a) **Metastatic cerebral abscesses**  
 (b) **Hypertrophic osteoarthropathy**
- Treatment
- (A) **Acute stage:**  
       First 6-8 weeks conservative
- (1) **Medicinal**
- (a) **Internal expectorants**
- (b) **Deodorant inhalations**
- |                 |        |
|-----------------|--------|
| 1 Creosote      | drm II |
| Acid carbollic  | drm II |
| Spt. chloroform | drm II |
| Tr. iodine      | drm I  |
| Spt. ætheris    | drm I  |
- (c) **Intra-tracheal medications**  
 20 c.c. of warmed 10% gomenol in lipodol by intranasal catheter
- (d) **Specific medication**  
       N. A. B.  
       Emetine  
       Quinine



**(2) Postural drainage:**

For at least 22 out of 24 hours

**Ind Communication with a bronchus****Position** Depends on the site of the abscess

(1) Acute rupture

(a) Raise the foot of the bed

+ (β) Normal lung uppermost

(2) Chronic rupture

Any position which drains best

**(3) Bronchoscopic aspiration**

Twice a week

**Ind (a) Root abscess****(b) Bronchial abscess**

(a) Failure of postural drainage

(β) Addition to postural drainage

**(c) Foreign body abscess****(d) Diffuse septic pneumonitis****(4) Phrenic nerve avulsion:****Ind (a) Basal abscess****(β) Bronchial abscess****(c) Haemoptysis****(5) Pneumothorax Dangerous****Ind (a) Multiple abscesses****(β) Central abscess****(c) Bronchiectatic association****(d) Bronchial communication****(e) No pleural adhesions****Dangers (1) Rupture into pleura****(2) Metastatic cerebral abscesses****(B) Chronic stage:****: After 6-8 weeks Operative****Operative Ind (1) After 6-8 weeks from onset****(2) Septic or severe toxic course****(3) Persistent course****(4) Stationary course****(5) Increasing size****(6) Shut off lesion****(7) Peripheral lesion****(8) Large lesion****(9) Impending perforation:**

Radiological evidence

**Operations: (1) Thoracotomy and drainage Two stage****Ind (1) Chronic local abscess****(2) Peripheral situation**

- (3) No widespread changes
- (4) Failure of conservative methods  
For two months

Tech (1) First stage: Exploration  
By resection of a rib  
(a) Upper lobe axillary  
(b) Lower lobe postero-lateral

↓ (2) Second stage Drainage  
Ind One week after exploration

Tech (a) Aspiration  
↓ (b) Opening by finger  
↓ (c) Drainage  
(a) Tube  
(b) Packing  
(7) Caustery

### (2) Lobectomy

Ind (1) Unilateral lobe affection  
(2) Unilateral multiple abscesses  
(3) Unilateral bronchiectasis

Pre-oper Phrenic evulsion

### (3) Thoracoplasty

Ind (1) Unilateral lobe affection  
(2) Unilateral multiple abscesses  
(3) Unilateral bronchiectasis  
(4) Central abscess  
(5) Bronchial drainage possible  
(6) Persistent sinus  
(7) Failure of lung wall to collapse

## (3) GANGRENE OF THE LUNG

Etiol (1) Post-operative  
(2) Abscess lung

Path Multiple areas of patchy gangrenous broncho-pneumonia

Clinic (1) Pronounced signs and symptoms of abscess lung  
(2) Sputum (a) Nauseating fetor  
(b) Sloughs of lung tissue  
(c) *Hæmoptysis* + +

(3) X-Ray diffuse zone of dense opacity interspersed with clear areas

Treat Medical as for lung abscess

## (V) CHRONIC AFFECTIONS OF THE LUNGS:

### (1) PULMONARY TUBERCULOSIS

Path. types (1) Chronic, fibroid or productive  
(2) Acute, pneumonic, caseous or exudative

*Indications for surgical treatment*

- (1) Local or unilateral focus
- (2) Chronic, fibroid or productive type

**(3) Pulmonary compression For**

- (a) Functional rest
- (b) Emptying of the lung
- (c) Check on the symptoms

***Indications for collapse treatment***

- (1) Chronic, slowly progressive, unilateral ulcero-cavernous or ulcero-fibrous
- (2) Chronic persistent
  - (a) Cough with expectoration
  - (b) Hæmoptysis
- (3) Failure of
  - (a) Medical treatment
  - (b) Phrenic avulsion
- (4) Tuberculous pyothorax

***Contraindications for collapse treatment***

- (1) Extensive disease of opposite lung
- (2) Tuberculosis elsewhere
- (3) Old age or poor general condition
- (4) Heart, renal or other complications

***Techniques of collapse treatment***

- (1) Pneumothorax
- (2) Extrapleural pneumolysis
- (3) Thoracoplasty

***Surgical procedures for pulmonary tuberculosis*****(1) Artificial pneumothorax :****(I) Intrapleural pneumothorax**Ind (A) **Unilateral focus** : Tuberculous

- (a) Acute exudative or ulcerous form
- (b) Hæmoptysis Severe and repeated
- (c) Progressive disease
- (d) Cavity formation
- (e) Secondary infection
- (f) Associated laryngeal tuberculosis
- (g) Natural pneumothorax
- (h) Tuberculous pleurisy
- (i) Associated diabetes or pregnancy

**(B) Bilateral foci** : Tuberculous

- (a) Apical lesion on better side
  - (1) Old fibrotic lesion of one apex
- + (b) Contralateral acute spread
- (b) Not more than  $\frac{1}{3}$ rd of opposite lung affected

**(C) Non-tuberculous indications**

- (a) Pain of acute pleurisy :  
200—400 c.c.

- (b) **Lobar pneumonia**  
Early and unilateral  
300—400 c.c. at 24 hours intervals
- (c) **Bronchiectasis**  
(a) Unilateral basal  
(b) Recurrent hæmoptysis
- (d) **Thoracoscopy**  
Diagnostic or pre-operative
- Contraind** (a) Advanced bilateral foci  
(b) Tuberculosis elsewhere  
(c) Pleural adhesions  
(d) Pneumonic consolidation  
(e) Intense fibrosis  
(f) Intestinal or urinary toxæmia
- Tech** (See under Operations on Chest)
- Post. compl** (1) **Pleural syncope**  
**Cause** Reflex inhibition of medullary centres through the vagus, independent of local anaesthesia  
**Treat** (1) Withdrawal of needle  
(2) Antishock treatment
- (2) **Temporary dyspnoea**  
**Etiol** (a) Cardiac displacement  
(b) Mediastinal displacement  
(a) Opposite side  
(c) Flapping
- Causes** (1) High positive pressure  
(2) Hypermobile mediastinum
- Clinic** (a) Temporary dyspnoea & oppression  
(b) Progressive loss of weight
- (3) **Reaction** Rise in temperature
- (4) **Hæmorrhage**
- (5) **Surgical emphysema**
- (6) **Pleural effusion**  
**Cause** Rupture of adhesions  
**Path** (a) Serous not bad  
(b) Hæmorrhagic  
(c) Purulent serious
- Clinic** (a) Abrupt and early rise in pressure  
(b) Malaise to dyspnoea  
(c) Screening periodical
- Treat** Air replacement
- (7) **Empyema**
- (8) **Spread to contralateral lung**  
**Clinic** (a) Exacerbation of symptoms  
(b) Physical signs  
(c) X-Ray

**(6) Intercostal neurectomy:**

Ind An addition to phrenicectomy

Tech Section of 2nd to 11th intercostal nerves

**(7) Extrapleural thoracoplasty:**

Extent (A) Partial basal or apical

(B) Complete

Ind (1) **Unilateral widespread long standing pulmonary tuberculosis with failure of or contraindication for pneumothorax**

(2) Fibro-caseous lesion with

(a) Slight pyrexia

+ (b) Hemoptysis

+ (c) General good condition

(3) Age between 15 and 40

(4) Tuberculous empyema

(5) Absence of complications elsewhere

Contraind (1) **Bilateral disease**

(2) Age below 15 and above 40

(3) **Bad general health with poor resistance**

(4) T B. elsewhere

(5) **Complications:**

(a) Lung

(b) Cardiovascular

(c) Renal

(d) Intestinal

(e) Laryngeal

(6) Local conditions (a) Progressive disease

(b) Active disease

(c) Fibroid disease

Tech (1) **Sauerbruch** Posterior resection(2) **Wilms:** Posterior and anterior resection(3) **Brauer** Whole rib resection

(See under Operations on Chest)

**(2) PULMONARY SYPHILIS**Path (1) **Pulmonitis alba:**

Congenital syphilis

Peribronchial fibrosis with hepatisation

(2) **Tertiary syphilis**

Clinic (1) Lung condition

(2) No tuberculosis

(3) Wassermann or Kahn

(4) Reaction to antisyphilitic treatment

Clinical types (1) **Whooping cough syndrome**(2) **Chronic bronchitis**(3) **Gummatous**

- (4) Exudative
- (5) Pulmonary arterial sclerosis

Treat Antisyphilitic

## (VI) TUMOURS OF THE LUNG

### (1) CYSTS OF THE LUNG

- (A) Solitary large cysts
  - (a) Distension cysts in infants
  - (b) Small silent cysts
- (B) Multiple cysts
  - (a) Medium-sized root cysts
  - (b) Small cysts
    - (a) Lobar honey-comb lung
    - (B) Diffuse or scattered

Comp (1) Pressure

(2) Infection cough, expectoration, fever

(C) Poly-cystic or congenital cystic disease:

Theories (1) Congenital

(2) Bronchiectatic

Sign X-Rays 'soap bubble' lung

(D) Hydatid cyst

### (2) SIMPLE TUMOURS

- (a) Chondroma
- (b) Lipoma
- (c) Angioma
- (d) Endothelioma

### (3) MALIGNANT TUMOURS

(A) Primary bronchial carcinoma

Eti Men between 40 and 60

Right upper lobe

Cause Chronic bronchial irritation

Origin Mucous membrane of (a) Larger bronchi  
(b) Bronchioles

(1) Main stem bronchial

(2) Peripheral bronchiolar

Path (1) Oat celled 50%  
(2) Squamous celled 20%  
(3) Columnar celled  
(4) Spheroidal celled  
(5) Adeno-carcinoma

Spread (A) Infiltration Of parenchyma

(B) Permeation:

(a) Peribronchial lymphatic permeation

(b) Tracheo-bronchial lymph glands

(c) Pleura

(C) Embolism

(a) Liver

	(b) Brain	
	(c) Bones	Vertebrae, long bones
Clinic		
Symptoms	(1) Cough and hæmoptysis	
	(2) Chest pain	pleurisy
	(3) Dyspnoea	
	(4) Pulmonary suppuration	
	(5) Debility and emaciation	
	(6) Metastatic symptoms	
Signs	(1) Local	(a) Pleurisy
		(b) Consolidation
		(c) Collapse
	(2) Pressure	Due to glandular secondaries
		(a) Nerves
		(b) Veins
		(c) Trachea
	(3) Bosco's homolateral contortion of chest	
		Due to muscle rigidity
	(4) Secondary metastases	Bones
	(5) Osteo-arthritis	
Special signs	(1) X Rays	(a) Plain
		(b) Lipoldol
		(c) After pneumothorax
	(A) Hilal or bronchial	
		Radiating shadow from hilum
	(B) Pneumonic	
		Rounded, defined shadow with irregular density
	(C) Atelectatic	
	(2) Bronchoscopy (+ Biopsy)	
	(3) Sputum	Wet film process
Diff. diag	(A) Pulmonary group:	
	(1) Lung diseases	Pneumonia
		Tuberculosis
	(2) Pleural diseases	Pleurisy
		Hæmothorax
		Empyema
	(3) Bronchial diseases:	Bronchitis
		Bronchiectasis
	(B) Nervous group:	
	(4) Cerebral diseases	Tumours
		Abscess
		Encephalitis
		Meningitis
	(5) Spinal diseases	Transverse myelitis
		Paraplegia
		Caries
		Lumbago

**(C) Miscellaneous group**

- (a) Gastric lesions
- (b) Gall bladder lesions
- (c) Liver lesions
- (d) Bone lesions

**Compl (1) Bronchial**

Bronchitis, bronchopneum. bronchiectasis

**(2) Lung**

Atelectasis abscess, gangrene, emphysema

**(3) Pleura Pleurisy haemothorax, empyema****(4) Pressure complications****Treat (1) Lobectomy (a) One-staged****(b) Multi-staged****Ind** Peripheral growths**(2) Pneumonectomy****(3) Deep X Rays****(4) Radon intubation****(B) Secondary carcinoma or sarcoma of the lung****Source (1) Columnar or spheroidal celled carcinoma****(2) Sarcoma****(3) Melanoma****Path (a) Blood embolism****(b) Peribronchial lymphatic permeation****(c) Infiltration****Clinic (1) Pulmonary signs in every case of malignancy****(2) X Rays Cannon ball metastases****Treat Deep X Rays****(4) APICAL TUMOURS****Varieties (1) Apical lung carcinoma****(2) Bronchial growths****(3) Malignant metastases****(4) Nerve tumours****Syndrome (1) Acute persistent unilateral shoulder girdle pain****(2) Horner's syndrome****(3) Paresis of hand****Signs X-Rays (a) Apical shadow****(b) Erosion of (a) Ribs****(b) Transverse processes****Treat Chordotomy (palliative)****(VII) IMPORTANT POINTS****(A) Collapse of the lung**

- (1) In massive collapse, the lung does not leave the chest wall  
X Ray shows dense homogenous one sided shadow with  
mediastinum diaphragm and chest wall drawn towards  
the lung.



- (2) Factors in massive collapse of the lung
  - (1) Inhibition of respiration and cough
  - + (2) Thick and viscid bronchial secretion.
- (3) Death from uncomplicated massive collapse is rare
- (4) Main causes of post-operative collapse of the lung
  - (1) Bronchial obstruction
  - (2) Diaphragmatic and abdominal wall dysfunction.
- (5) Apart from careful preoperative treatment prevention of pulmonary collapse depends on maintenance of full respiratory excursions.
- (6) All patients having a general anaesthetic should be hyperventilated with  $\text{Co}_2$  at the end of the anaesthesia.

#### (B) Pneumonia :

- (7) Avoid large amounts of intravenous fluids in cases where there is respiratory catarrh of any kind. Concentrated solutions such as 20% glucose can be given.
- (8) Morphia and sedative linctus must be withheld in pneumonia.
- (9) Pneumonia and heart therapy
 

(a) Digitalin 1/240 gr	8 hourly	
(b) Atropine sulph	1/100 gr	
Strychnine hydrochlor	1/64 gr	} 6 hourly
Adrenaline	5-10 min.	
(c) Pituitrin	$\frac{1}{2}$ -1 c.c.	
(d) Camphor in oil		
(e) Coramine		
(f) Caffeine sodium benzoate		
(g) Strophanthin	1/200 gr	B D
(h) Intravenous glucose		
(i) Medicines	M & B. 693	
	Expectorants	

#### (C) Lung abscess

- (10) Pulmonary suppuration
  - (a) Bronchial obstruction
  - + (b) Infection
    - (a) Aspiration
    - (b) Contiguity
    - (r) Blood.
- (11) Of all cases of lung abscess, about three fourths are post-operative the remainder being associated with pneumonia or malignant growths.
- (12) Lung abscess follows tonsillectomy in between 1 in 2000 to 1 in 3000 cases.
- (13) Pathognomonic signs of lung abscess
  - 'A' (a) Local consolidation

- ↓ (b) Expectoration of considerable quantity of pus
- ↓ (c) Local cavitation
- (B) (a) Signs of cavity developing rapidly after expectoration of a quantity of pus
  - (b) Elastic tissue in sputum
  - (c) Leucocytosis 20,000-30 000.
- (14) Possibility of a lung abscess must always be considered when, following the acute onset of a respiratory illness, a large amount of purulent sputum is coughed up about the 10th to 14th day
- (15) As regards expectoration of sputum there is relation between posture and quantity of sputum expectorated
  - in (a) Bronchiectasis
  - (b) Lung abscess.
- (16) Large amount of pus expectorated
  - ? Lung abscess
  - ? Liver abscess burst in lung
  - ? Empyema burst in lung
- (17) Differential diagnosis of sputa in abscess and gangrene
  - (A) Abscess lung :
    - (a) Whitish yellow purulent
    - (b) Odourless
    - (c) Pyogenic organisms
  - (B) Gangrene lung :
    - (a) Foul smelling
    - (b) Elastic tissue
    - (c) Spirochaetes.
- (18) In abscess of the lung acute cases should be treated expectantly and chronic cases after 6 to 10 weeks should be treated surgically
- (19) In lung abscess, medical treatment should be given a trial for at least 6 to 8 weeks before resorting to surgery
- (20) A lung abscess is never to be aspirated by a syringe, as it leads to sepsis of the pleural cavity
- (21) If after about 3 weeks of medicinal treatment, no signs of commencement of drainage is forthcoming in lung abscess, pass in an aspirating bronchoscope.
- (22) Bronchoscope is indicated in all cases of lung abscess as a diagnostic and therapeutic measure except in abscess of the upper lobe.
- (23) When a lung abscess ruptures into a bronchus, take care of the aspiration into the other lung which must always be kept uppermost.
- (24) As soon as the abscess has ruptured into a bronchus postural drainage should be instituted.

- (25) Surgery is indicated in
- (a) Failure to rupture into a bronchus
  - (b) Failure of postural drainage.
- (26) If at the end of three months, combined medical and bronchoscopic treatment effects no improvement, direct surgical drainage should be instituted
- (27) Delayed surgery has been responsible for the high mortality of lung abscess which is between 20 and 30%
- (28) Main surgical methods in lung abscess
- (1) Thoracotomy and drainage
  - (2) Lobectomy
- (29) Main lines of treatment in lung abscess
- (A) Medicinal and supportive for three weeks
- ↓ (B) Bronchial drainage for three months
- (a) Postural
  - (b) Bronchoscopic
- ↓ (C) Surgical drainage After 8 to 10 weeks
- or (D) Lobectomy
- (30) Points about lung abscess
- (a) Tuberculosis, foreign body and tumour are important local etiological factors
  - (b) Thoracocentesis should be avoided
  - (c) Pneumothorax is dangerous
  - (d) If conservative methods fail for 6 weeks, surgery should be resorted to
  - (e) Preoperative X Ray
  - (f) Two-stage operation under local anaesthesia and with dependent drainage.

#### (D) Pulmonary tuberculosis

- (31) Chief danger of any form of collapse is exacerbation of a tuberculous focus in parts of the lung or lungs, other than those in which collapse is prospected.
- (32) Collapse therapy by pneumothorax or surgical means is specially indicated in cavernous type of the disease.
- (33) Every case with active spreading disease of one lung and a positive sputum must be collapsed without delay
- (34) Methods of collapse therapy
- (A) Conservative pneumothorax
  - (B) Surgical
    - (a) Phrenicectomy
      - (1) Crushing
      - (2) Section
      - (3) Avulsion
    - (b) Thoracoplasty partial or complete
    - (c) Pneumolysis.

- (35) Complications of collapse therapy
  - (a) Aspiration into healthy parts or lung
  - (b) Rupture into pleural cavity
- (a) Pneumothorax
- (36) Chief indication for artificial pneumothorax is pulmonary tuberculosis, either as a primary measure or as an addition to other measures and the principle is maximum degree of rest for the diseased area.
- (37) Two primary factors in indications for pneumothorax
  - (1) Degree of activity indication
  - (2) Degree of fibrosis contraindication.
- (38) If pneumothorax treatment is to be given a trial try it early before there is time for
  - (a) Pleural adhesions
  - (b) Pneumonic consolidation
  - (c) Bilaterality
- (39) Pneumothorax is indicated in every unilateral disease in early adult life with
  - (a) Persistently positive sputum
  - (b) Clinical evidence of activity
  - (c) Failure of improvement or actual spread after one month's rest, as seen by clinical and X Ray methods.
  - (d) Younger patient
  - (e) More toxæmia.
- (40) Every unilateral case of improved phthisis with re appearance of symptoms on resumption of activities should be submitted to pneumothorax as an aid to return to work.
- (41) Persistently positive sputum after recovery of all other signs after sanatorium treatment should be submitted to pneumothorax, so as to avert two dangers
  - (a) Spread or recrudescence
  - (b) Infectivity
- (42) In phthisis complicated by pregnancy which has already passed the 16th week little is gained by operative termination and if the disease is unilateral pneumothorax is indicated.
- (43) If pneumothorax is contemplated on one side there should not be involvement in disease greater than one third of the opposite lung especially apical.
- (44) Ideal of pneumothorax is complete collapse of the whole lung without displacement of the mediastinum.
- (45) Routine things to be done in pneumothorax treatment
  - (1) Examination of sound lung

- (2) Repeated skiagrams
- (3) Repeated sputum examinations.

- (46) Never give a second refill until general reaction from previous one has completely subsided.
- (47) Until collapse is established screening should be done before and after every refill.
- (48) Guide for refill is the optimum intrapleural pressure and not the amount of air. It should be slightly negative in earlier stages.
- (49) More than 600 c.c. or less than 200 c.c. of air required at a refill are abnormal and show that refills are too slow or too rapid.
- (50) The most frequent cause of failure to obtain a complete collapse of the lung is the presence of pleural adhesions.
- (51) An average total period of two and a half to three years of collapse should be maintained in artificial pneumothorax.
- (52) Stage of re-expansion is most critical and requires close observation for reappearance of clinical or X Ray evidence of recrudescence.

#### (b) Phrenicectomy

- (53) Three ways of phrenic procedure
  - (1) Crushing regeneration within 4-6 months
  - (2) Section
  - (3) Avulsion

Together with section of nerve to the subclavius.
- (54) Phrenicectomy diminishes basal aspiration and is indicated in apical lesions also.
- (55) Avulsion of phrenic nerve
  - (a) Adjunct to pneumothorax
  - (b) Preliminary to thoracoplasty
  - (c) Palliative for
    - (a) Cavity
    - (b) Hæmoptysis
    - (r) Toxmia
    - (s) Pleural pain.

#### (c) Thoracoplasty

- (56) Surgical treatment (thoracoplasty) of pulmonary tuberculosis is only to be considered after failure of or non-application of artificial pneumothorax but must be in good time and not too long deferred.
- (57) Patients with unilateral or largely unilateral disease, in whom pneumothorax is unsatisfactory can be cured by complete or partial thoracoplasty alone or combined with pneumothorax or phrenicectomy. The procedure

is more successful in chronic productive forms than in purely exudative, and is indicated when sanatorium treatment of three or four months does not lead to improvement, and especially in the presence of cavities and repeated hæmoptysis.

- (58) Chief factor influencing the choice of a case for thoracoplasty is the condition of the better lung active disease of which except at the apex, is a definite contraindication.

(d) *Miscellaneous*

- (59) Sequence of procedures in T. B. lungs

(1) Phrenic avulsion

↓ (2) Pneumothorax

↓ (3) Thoracoplasty

- (60) X Ray in phthisis

(a) Soft, fluffy shadows with ill defined edges  
Active disease

(b) Linear dense sharply defined shadows  
Old inactive disease

- (61) Every care should be taken to rule out phthisis, even quiescent before giving a general anæsthetic and avoid ether if it has to be given.

(E) *Tumours of the bronchi and lungs*

- (62) Bronchiectasis and congenital cystic disease of the lungs simulate each other

- (63) Pulmonary neoplasm ranks in frequency only after carcinoma of the
- (a) Stomach
  - (b) Breast
  - (c) Uterus
  - (d) Oesophagus.

- (64) All carcinomas of the lung arise in the deep layers of the bronchial or bronchiolar mucosa.

- (65) 80% of carcinoma lung arise in larger bronchi.

- (66) Pathological groups of lung carcinoma

- (1) Main stem bronchial carcinoma
- (2) Peripheral carcinoma.

- (67) Dry spasmodic cough with viscid pearly sputum tinged with blood in a male over 40 years of age with no tuberculous or other reasonable cause of cough, should lead to the suspicion of pulmonary carcinoma.

- (68) One-third of lung carcinomas may commence as acute respiratory infection

Pain + cough + dyspnoea + sputum with or without blood + rigors with pyrexia.

- (69) Most common complaints in bronchial carcinoma  
 (a) Cough  
 (b) Chest pain  
 (c) Dyspnoea  
 (d) Expectoration with or without hæmoptysis  
 (e) Chest catarrh.
- (70) Any unexplained cough in a middle aged patient  
 ? Carcinoma lung
- (71) Any middle aged patient, free from tuberculosis, reveals  
 atelectasis of one lobe on X Ray  
 ? Carcinoma bronchus.
- (72) All patients with persistent cough after middle age  
 (1) Take X Rays  
 (2) Do bronchoscopy
- (73) Dyspnoea, pain expectoration hæmoptysis and pleural  
 effusion are the five main clinical features of carcinoma  
 lung
- (74) Every patient with hæmoptysis bronchial obstruction or  
 pleural effusion should be most carefully examined to  
 exclude carcinoma of the lung
- (75) Slight pyrexia with weakness and breathlessness in a  
 person past middle age  
 ? Carcinoma lung
- (76) Later stages of lung carcinoma  
 (1) Supraclavicular adenopathy  
 (2) Phrenic paralysis  
 (3) Mediastinal involvement.
- (77) In every case of malignancy anywhere X Ray the chest  
 for secondaries.
- (78) Dissection of the hilum is better than tourniquet method  
 in pneumonectomy for carcinoma lung

#### (F) Bronchiectasis

- (79) The chief etiology of acquired bronchiectasis is any lung  
 pathology especially valvular bronchial obstruction.
- (80) Cough fever and chronic toxæmia are the chief symptoms  
 of bronchiectasis.
- (81) Postural drainage is the best form of conservative and  
 preoperative treatment in bronchiectasis.
- (82) Lobectomy is the operation of choice for unilateral  
 bronchiectasis.
-





- Signs** (1) **X Ray**  
 (a) Uniform opacity with invisible diaphragm  
 (b) Displaced thoracic viscera  
 (2) **Aspiration**

**Treat** **Aspiration** With oxygen replacement (200 c.cs.)

- Post. compl** (1) Shock and pleural reflex  
 (2) Trauma to the lung  
 (3) Infection empyema  
 (4) Acute cedema or failure of re-expansion of lung

### (3) PNEUMOTHORAX

**Def** Presence of gas in pleural cavity

- Etio** (1) **Therapeutic** (a) Phthisis  
 (b) Pleurisy  
 (c) Effusion  
 (2) Diseases of the lung Phthisis  
 (3) Operations on chest Thoracotomy  
 (4) Traumatic Stab wounds

**Varities** (A) **Open**

- Etio** (a) Trauma stab wounds  
 (b) Operations thoracotomy

- Compl** (a) Flapping mediastinum  
 (b) Infection

(B) **Closed:**

**Etio** Therapeutic

(C) **Ingravescent valvular**

- Etio** (1) **Lung conditions**  
 (a) Ruptured T B focus  
 (b) Ruptured emphysema  
 (c) Stab wound lung  
 (d) Lobectomy

(2) **Trauma of the chest**

Sucking wounds of chest wall

**Clinic** Rapid progressive and extreme clinical course

- Clinic** (1) **History:** of (a) Respiratory strain  
 (b) Artificial pneumothorax  
 (2) **Initial symptoms** shock pain  
 (3) **Pressure symptoms**  
 (a) Respiratory Dyspnoea  
 Cyanosis  
 (b) Cardiac Tachycardia  
 (4) **Local signs**  
 (a) Air in thorax Hyper resonance  
 Faint breath sounds  
 (b) Displaced neighbours Lung heart

## Special signs

- (1) **X Ray**
  - (a) Abnormal lighting of air
  - (b) Collapse of the lung
  - (c) Displaced heart mediastinum and diaphragm

(2) **Aspiration**

- Compl
- (1) Collapse of the lung
  - (2) Flapping mediastinum in open variety
  - (3) Cardiac displacement

Treat (A) **Prophylactic**

- (1) Turn the sucking wounds into non sucking

By airtight closure (a) Temporary  
(b) Permanent

- (2) Positive pressure anaesthesia

In chest operations

- (3) Traction on the lung towards the wound

(B) **Therapeutic Aspiration**

- Ind
- (a) Extreme dyspnoea
  - (b) Flapping mediastinum
  - (c) Cardiac irregularity

(4) **HÆMOTHORAX**

Def Collection of blood in pleural cavity

- Eti
- (1) **Trauma** Stabs, gunshot wounds
  - (2) **Aneurysmal rupture**
  - (3) **Back pressure** (a) Carcinoma lung or pleura  
(b) Cirrhotic liver
  - (4) **Blood diseases** Scurvy purpura

- Clinic
- (1) **History** Of etiology
  - (2) Presence of etiological factor
  - (3) **Respiratory** → cardiac distress
  - (4) **Signs of pleural effusion**
    - (a) Local collection of fluid
    - (b) Displaced thoracic viscera
      - (a) Lung
      - (b) Heart
      - (c) Diaphragm
      - (d) Liver

- (5) **Signs of internal hæmorrhage** If acute

- (6) **Absorption toxæmia** (a) Acute  
(b) Chronic

- Signs
- (1) **X Ray** As in pleural effusion
  - (2) **Aspiration**

- Compl
- (1) **Collapse of the lung**
  - (2) **Empyema (Infection)**
  - (3) **Shock and collapse**
  - (4) **Blood toxæmia**

Treat: (A) Passive: Morphia  
Anti-shock treatment  
Coagulants

(B) Active

- Ind (1) Post-traumatic  
(2) Acute pressure signs  
(3) Acute progressive hæmorrhage:  
(a) General signs of hæmorrhage  
(b) Steady fall in B.P

- Tech (1) Recent hæmothorax: Within 5 days  
Aspiration with oxygen replacement  
(2) Incompletely absorbed hæmothorax  
(a) Intercostal incision  
↓ (b) Removal of clot  
↓ (c) Evacuation of blood  
↓ (d) Oxygen replacement  
(3) Infected hæmothorax  
(a) Rib resection  
↓ (b) Drainage

(5) (A) HYDRO }  
(B) HÆMO } PNEUMOTHORAX  
(C) PYO }

Def Gas with serum blood or pus in pleural cavity

- Etio (1) Phthisis: Hydro or pyo-pneumothorax  
(2) Trauma Hæmo-pneumothorax  
(3) Abscess lung Pyo-pneumothorax

- Clinic (1) Respiratory distress: Pressure symptoms  
(2) Local signs  
(a) Pleural contents (a) Air  
+ (b) Fluid  
(b) Displaced thoracic viscera  
Lung heart, diaphragm liver  
(3) Special signs  
(a) Hippocratic succussion  
(b) Altering dullness in different positions

- Signs (1) X Ray upper level horizontal  
(2) Aspiration

Treat As in hydro hæmo or pyothorax

(6) CHYLOTHORAX

- Etio (1) Thoracic duct (a) Trauma  
(b) Obstruction  
(2) Malignancy (a) Primary Pleura or lung  
(b) Secondary: Breast

Clinic As in pleural effusion

- Compl (1) Inanition cachexia loss of lymph  
 (2) Infection empyema

(7) **PYOTHORAX EMPYEMA**

Def Collection of pus in pleural cavity

(A) **ACUTE EMPYEMA**

Etio Males children

Sources (A) **Primary**

(a) **Lung affections**

(1) **Pneumonia 75%**

(a) Syn-pneumonic

(β) Meta pneumonic

(2) **Phthisis 10%**

(3) Infarction

(4) Abscess

(b) **Blood infection**

Streptococcal septicæmic

(c) **Traumatic**

(d) **Secondary infection**

Of aseptic pleural collections

(B) **Secondary Extension from neighbours**

(1) **Mediastinum**

(a) Osteomyelitis vertebra

(b) Esophagitis

(c) Cervical cellulitis

(2) **Abdomen**

(a) Subphrenic abscess

(b) Liver abscess

**Bacteriology (1) Pneumococcal**

Etio Lobar pneumonia

Path Meta pneumonic

Clinic (a) Early thickening of p

(b) Greenish yellow

(c) Less toxæmia

(d) More local fibrosis

(2) **Streptococcal**

Etio (a) Broncho-pneumonia

(b) Septicæmia

Path Syn-pneumonic

Clinic (a) Thin pus

(b) Greenish brown

(c) More toxæmia

(d) Less local fibrosis

(3) **E coli**

Etio Sub-diaphragmatic abscess

(4) **E tuberculosis**

Etio Phthisis

(5) **Anaerobic bacilli**

Etio Gangrene lung

Clinic Fœtid smell

- Sites (1) **Bilateral total**  
 (2) **Unilateral total**  
 (3) **Partial or localised**  
     (a) **Inter-lobar**  
     (b) **Apical**  
     (c) **Diaphragmatic or infra pulmonary :**  
         (α) **Internal (mediastinal)**  
             No connection with thoracic wall  
         (β) **External**  
             Contact with thoracic wall  
         (γ) **Combined**

- Clinic (1) **Etiology :** Pneumonia  
                                 Phthisis  
                                 Trauma  
 (2) **Respiratory distress** Dyspnoea  
 (3) **General toxæmia :** Acute,  
   Chronic  
   Latent  
 (4) **Pleural effusion :**  
     (a) **Fullness of the chest contour**  
     (b) **Diminished respiratory mobility**  
     (c) **Dull note**  
     (d) **Absent breath sounds**  
     (e) **Displaced thoracic viscera**

**Clinical varieties :**

- (A) { (1) **Syn pneumonic :** Septicæmic  
       (2) **Meta pneumonic :** Unresolved pneumonia  
 (B) { (3) **Primary :** Sequela to chest diseases  
       (4) **Secondary :** Sequela to upper abdominal sepsis  
 (C) { (5) **Acute :** Acute general and local signs  
       (6) **Chronic :** Chronic general and local signs  
       (7) **Latent :** Chronic general toxæmia  
                         + Accidental finding of local signs  
 (D) (8) **Empyema necessitatis :**  
             As a differential diagnosis of thoracic wall  
             abscess

- Signs (1) **Aspiration** Examination of the fluid  
                                 (a) **Physical**  
                                 (b) **Cytological**  
                                 (c) **Bacteriological**  
 (2) **X Ray**  
     (A) **Pleural effusion :**  
         (a) **Uniform shadow**  
         (b) **Obliteration of diaphragmatic outline**





- Ind (a) Children under six  
(b) Desperately ill patients
- Tech (1) Local infiltration anaesthesia  
Skin and pleura  
(2) Small intercostal incision  
(a) Near post. axillary line  
(b) Dependant position  
(3) Insertion of trocar and cannula  
(4) Introduction of self retaining catheter  
(5) Withdrawal of cannula  
(6) Collodion sealing of the incision  
(7) Connection to suction apparatus
- Compl (a) Accidental displacement of tube  
(b) Blockage  
(c) Contact with diaphragm  
(d) Cellulitis chest
- (2) **Costal drainage**
- Ind (1) Failure of repeated aspirations  
+ (2) Adults
- Tech (1) Rib resection  
↓ (2) Water tight closure by  
(a) Stitching  
(b) Vaseline gauze  
(c) Adhesive plaster
- (C) **Open drainage by rib resection**
- Ind (a) Meta pneumonic with no toxemia  
(b) Thick pus  
(c) Pressure symptoms not marked  
(d) Failure of aspirations and closed drain  
(e) After 3 weeks from onset  
(f) Adults
- Pre-oper (1) X Ray  
(2) Aspiration  
(3) Morphia if no cyanosis
- Anaesth (1) General evipan  
(2) Local infiltration 1% novocain  
(a) Skin and subcut. tissues  
↓ (b) Muscles + intercostal bundle  
↓ (c) Periosteum  
↓ (d) Intercostal nerve  
(a) Rib above  
(β) Rib to be excised  
(γ) Rib below  
↓ (e) Pleura



- Position**
- (1) Prone
  - (2) Sitting
  - (3) Lateral
    - (a) Affected side uppermost
    - (b) Affected side lowermost
- Sites**
- (1) Rib immediately below the inferior angle of the scapula, palpated with the arm by the side
  - (2) Lowermost limit As shown by X Ray
  - (3) 8th or 9th rib in scapular line
  - (4) 7th or 8th rib in mid-axillary line
- Steps**
- (1) Incision
    - (a) Parallel to and over the rib
    - or (b) Vertical with rib as mid point
  - (2) Stripping of periosteum and intercostals
  - (3) Excision of the rib 2 to 4 inches
  - (4) Resection of the intercostal bundle
  - (5) Aspiration
  - (6) Incision of posterior periosteum
  - (7) Hulton's method opening of pleura
  - (8) Control over the sudden decompression
  - (9) Finger exploration of the cavity
    - (a) Extent
    - (b) Coagula
    - (c) Adhesions (locula)
    - (d) Condition of lung
    - (e) Dependant pocket
  - (10) Fresh lower rib resection  
If drainage is not dependant
  - (11) Drainage  
Short flanged and fenestrated rubber tube of  $\frac{1}{2}$  inch diameter
  - (12) Air tight closure  
With fixation of the tube to chest wall

#### *Post-operative management*

- (1) **Position :**
  - (a) Sitting or propped up
  - (b) Lateral with tilting on affected side
- (2) **Dressings** Twice a day  
Protection of skin by vaseline
- (3) **Drainage**
  - (A) **Suction drainage : Siphon**  
Closed drainage attached to siphon arrangement
  - (B) **Closed drainage Water tight**  
Water-tight drainage into a closed sterile glass bottle under an antiseptic fluid

Clamp the tube when bottle is being changed

(C) Open drainage

- (a) Change the tube every seven days
- (β) Reduce the size when
  - (1) Cavity is clean
  - (2) Cavity capacity less than 100 c.cs.
- (γ) Remove the tube gradually when
  - (1) Discharge is less and serous
  - (2) Within 2 to 4 weeks

*Advantages and disadvantages of drainage methods*

(A) Closed drainage

- Advant (a) Prevention of lung collapse
- (b) Gradual decompression
- (c) Prevention of secondary infection
- (d) Cleanliness of dressings
- Disadvant (a) Blocking of drainage
- (b) Ultimate inadequacy

(B) Suction drainage

- Advant (a) All advantages of closed drain
- + (b) Help to re-expansion of lung
- + (c) Better drainage
- Disadvant Difficulty in keeping air-tight

(C) Open drainage

- Advant (a) Easy and unblocked drainage
- (b) Irrigations possible
- (c) Succeeds where closed drain fails
- Disadvant Failure of re-expansion of lung

(4) Irrigations:

- Ind (1) Fibrin blocking
- (2) Fibrin deposits in the cavity
- (3) Poor discharge

- Contraind (1) Within five days of operation
- (2) Broncho-pleural fistula
- Violent cough on introduction of fluid

- fluids (1) Normal sterile saline
- ↓ (2) Dakin or encol

- Tech (1) Catheter and funnel method
  - (a) Run in the fluid from 18" height
  - ↓ (b) Keep in for 10 minutes
  - ↓ (c) Roll over and let it escape
- (2) Two tubes technique: (a) Inlet smaller tube upper
- (b) Outlet larger tube lower

- Frequency (1) Begin 2 to 5 days after operation

↓ (2) B. D

↓ (3) Once a week

- (5) Bier's cupping glass

Ind Open drain

- Frequency Start on third day twice a day

**(6) Positive—pressure breathing exercises :**

Time 48 hours after operation

- Tech (a) Deep breathing  
 (b) Wind instruments  
 (c) Woulfe's bottle  
 (d)  $\text{CO}_2$  inhalations

**Operative complications**

- (1) Shock and pleural syncope
- (2) Respiratory embarrassment
- (3) Unrestrained cough
- (4) Intercostal hæmorrhage

Treat Tie a ligature around the rib with gauze between its loop and the posterior surface of the rib

↓ Cut the ligature and remove the gauze after 48 hours.

**(5) No pus on pleural opening**

- Causes (a) Localised empyema  
 (b) Inter lobar empyema  
 (c) Lung abscess

Treat Explore by finger and needle

↓ Drain at appropriate level

**(6) Inadequate drainage :**

- Causes (a) Too high  
 (b) Too low

Treat Resection at the appropriate level

**(7) Inadvertent transpleural laparotomy**

Cause Too low opening

Treat Repair the incision in the diaphragm  
 Before empyema is opened

**Special varieties of empyema****(1) Intra-pulmonary empyema :**

Def. Encapsulated pus between the base of the lung and the diaphragm

- Varieties (1) Internal no contact with parietes  
 (2) External in contact with parietes  
 (3) Combined secondary contact with parietes

Clinic (1) All signs of empyema

(2) Special signs

- (a) Pain shoulder lower chest and upper abdomen
- (b) Marked cardiac displacement
- (c) X-Ray
- (d) Aspiration

Treat Drainage in one or two stages

- |                          |                          |
|--------------------------|--------------------------|
| (2) Inter-lobar empyema  | } clinic of lung abscess |
| (3) Mediastinal empyema  |                          |
| Treat two stage drainage |                          |
| (4) Bilateral empyema :  |                          |

**Clinic:** Extreme bilateral symptoms and signs

**Treat:** (1) Bilateral balancing aspirations

(a) Simultaneous

or (b) Two stage

↓ (2) (A) Unilateral intercostal drainage

+ (B) Contralateral aspirations

↓ (3) Bilateral intercostal drainage

↓ (4) (A) Unilateral costal drainage

+ (B) Contralateral intercostal drainage

↓ (5) Bilateral costal drainage

## (B) CHRONIC EMPYEMA

**Def** Chronic collection of pus in the persistent cavity between visceral and parietal layers of the pleura, due to failure of both the layers to come into contact with each other the following factors being absent

(a) Re-expansion of the lung

(b) Mediastinal replacement

(c) Diaphragmatic elevation

(d) Indrawing of the chest parietes

**Etiol** (1) **Primary or Insidious Tuberculosis**

(a) Primary tuberculous empyema

(b) Infected tuberculous effusion

(2) **Secondary**

(a) Secondary infection of pleural effusions

(b) Secondary to acute empyema

**Def** Failure of empyema wound to heal  
Within two months

**Causes** (1) **Failure of early diagnosis**

(2) **Failure of early treatment**

(3) **Faulty treatment**

(a) Too early drainage

(b) Too late drainage

(c) Misplaced drainage

(d) Imperfect drainage

(e) Non-drainage of a loculus

(4) **Faulty after treatment**

(a) Too short drainage

(b) Too long drainage

(5) **Mechanical causes**

(a) **Parietes**

(a) Inelasticity & thickening

(β) Osteitis of a rib

(b) **Cavity**

(a) Foreign body

(β) Failure to obliterate

- (c) Visceral wall
      - (a) Pulmonary collapse
      - (β) Thickened visceral pleura
      - (γ) Broncho-pleural fistula
    - (6) Nature of infection
      - (a) Tuberculosis
      - (b) Lung infection
      - (c) Actinomycosis
      - (d) New growth
  - Path (1) Thickening and fibrosis → rigidity  
Of the walls of the cavity
  - (2) Persistence of the cavity
  - (3) Persistence of the discharge
  - (4) Persistence of the thoracotomy sinus
  - (5) Chronic toxæmia
  - Clinic (1) Insidious or Primary :
    - (a) Latent
      - (a) Chronic toxæmia
      - ↓ (β) Accidental find of pleural effusion
    - (b) Empyema necessitatis
  - (2) Secondary
    - (a) Failure of acute empyema drainage wound to heal within two months
    - (b) *Persistent sinus discharging pus :*
      - (a) Thoracotomy
      - (β) Pleuro-bronchial
    - (c) Respiratory toxæmia
      - (a) Dyspnoea with cyanosis
      - (β) Emaciation
      - (γ) Clubbed fingers
  - Signs (1) X Rays
    - (a) Plain
    - (b) Lipoidol
      - (a) Tracheal
      - (β) Parietal sinus
  - (2) Examination of the discharge
  - Diff. diag (1) *Any chronic respiratory disease :*
    - (a) Bronchi
    - (b) Lungs
    - (c) Pleuræ
  - (2) *Any cause of chest abscess or sinus*
    - (a) Bone abscess
    - (b) Lymph gland abscess
    - (c) Breast abscess
    - (d) Gumma
    - (e) Tuberculosis
    - (f) Actinomycosis
  - (3) *Any cause of chronic toxæmia*

## Diagnostic points

- (1) History of acute empyema :  
With persistent thoracotomy sinus  
(For more than 8 weeks)
- (2) Phthisis complicated with pleural effusion
- (3) Any abscess in the thoracic parietes
- (4) Chronic respiratory toxæmia

## Compl

- (1) Chronic toxæmia  
With amyloid disease and exhaustion
- (2) Deformity chest scoliosis
- (3) Pleuro-bronchial fistula
- (4) Lung infection
- (5) Brain abscess
- (6) Pus or air embolism

Treat~ (A) If an ordinary empyema is discharging pus after 4 weeks and is not healed at the end of 8 weeks

Treat Investigate the cause and remove it

↓ (B) If no improvement

Treat Drain adequately For at least 4 months

↓ (C) If no improvement

Treat Radical operations

Pre-operative Good X Ray plates

Operations (A) Conservative

(1) Exploration → removal of etiology → disinfection → drainage

- (a) Resection of a rib
- (b) Thorough exploration
- (c) Removal of the underlying cause
- (d) Open drainage

↓ (2) Pleural wash-outs

Time Once or twice a week

Tech Two needles

- (a) One in 2nd interspace
- (b) Other at the bottom of the cavity

Fluid Dakin's solution

Method Run in the solution from upper needle  
↓ Withdraw by the lower needle

Position Sitting

+ (3) Positive pressure respiratory exercises

(B) Radical Closure of the cavity

(1) Operations on visceral pleura

Ind Failure of pleural irrigations

Tech (A) Delorme Decortication

- (a) Freely expose the cavity
- (b) Incise thick visceral pleura

- (c) Dissect the pleura off the lung
- (B) Ransohoff Discission

Division of visceral pleura into  
 $\frac{1}{2}$  squares upto the lung

(2) Operations on thoracic parietes

- (A) Extrapleural pneumolysis

- (B) Thoracoplasty

- Ind (a) Failure of adequate drainage  
 (b) Failure of pleural irrigations  
 (c) Failure of decortication  
 (d) Persistence for 4 months

- Tech (1) *Local or regional*

- (a) *Eatlander:*

Subperiosteal removal of  
 overlying parts of ribs

- (b) *Schede:*

Removal of (a) Ribs with periosteum  
 (b) Muscles  
 (c) Parietal pleura

- (2) *Extensive or total*

- (a) *Brauer*

(Decostalisation)

Removal of entire lengths  
 of ribs from 2nd to 11th

- (b) *Sauerbruch:*

(Paravertebral extra  
 pleural thoracoplasty)

Extrapleural subperiosteal resection of first eleven ribs, for 1 to 6 inches from the tips of transverse processes, in two stages, the periosteum being mopped with 10% formalin or Zenker's solution

- (c) *Wilms*

(Rib mobilisation)

- (a) Sauerbruch

+ (b) Costal cart. excision

*Indicative treatment of chronic emphysema*

- (1) Small recent cavity:

- (a) Exploration

↓ (b) Removal of etiology

↓ (c) Free drainage

↓ (d) Irrigations (if necessary)

- (3) Small long-standing cavity  
 ↓ (a) Removal of overlying ribs  
 ↓ (b) Mobilization and approximation of pleura  
 ↓ (c) Drainage  
 (5) Moderate sized cavity  
 ↓ (a) Exploration + drainage + irrigations  
 ↓ (b) Rib resection + decortication  
 (4) Large sized cavity  
 ↓ (a) Endoscopic exploration + drainage + irrigations  
 ↓ (b) Schede thoracoplasty + decortication  
 (6) Cavity + pleuro-bronchial fistula  
 ↓ (a) Exploration + free drainage  
 ↓ (b) Closure  
 + (c) No irrigations

# (1) Tuberculous empyema

Cause Artificial pneumothorax

- Groups (1) Primary No associated pulmonary lesion  
 (2) Secondary Etiological pulmonary lesion  
 (3) Complicated Secondary infection

Treat (1) Injection of Gauvain's fluid → aspiration →  
 air replacement

- ↓ (2) Pleural irrigations  
 With Saline, methylene blue acriflavine, iodine  
 sol. (1:1 to 0.1)

Time Once every week.

- ↓ (3) Closed intercostal drainage 10th interspace  
 ↓ (4) Phrenic avulsion + thoracoplasty

## Indicative treatment of tuberculous pleural effusion

(A) Clear serous fluid

- ↓ (a) Aspiration  
 ↓ (b) Gas replacement

(B) Purulent non-infected tuberculous effusion

- ↓ (a) Aspiration with or without gas replacement  
 (b) Pleural irrigations  
 (c) Oleo or gelatin-thorax  
 (d) Obliteration of the cavity

Ind (a) Controlled sepsis  
 (b) Good general condition

Tech (a) Multi-staged paravertebral thoracoplasty  
 + (b) Phrenic avulsion

(C) Purulent mixed pyogenic effusion

- ↓ (a) Rib resection  
 ↓ (b) Closed or open drainage

(2) Recurrent empyema:

Cause Incomplete healing of primary cavity  
 Time Few weeks to many years.



Clinic: (1) History of past empyema

(2) Chest symptoms

(3) Infected drainage scar

or (4) Empyema necessitatis

Sign Aspiration in the neighbourhood of or through the scar

Treat (1) Aspiration

↓ (2) Open drainage

↓ (3) Thoracoplasty

## (8) NEW GROWTHS OF THE PLEURA

### (A) Innocent

(1) Lipoma

(2) Fibroma

(3) Angioma

### (B) Malignant:

(1) Endothelioma (a) Single

(b) Multiple scattered

(c) Diffuse infiltrating

(2) Sarcoma

(3) Carcinoma secondary to (a) Lung

(b) Breast

(c) Oesophagus

(4) Melanoma secondary metastases

Clinic Blood stained pleural effusion

## (IX) IMPORTANT POINTS

### (A) Pneumothorax

(1) Pneumothorax checks bleeding and is auto-absorbed and so should not be interfered with unless there is urgent dyspnoea.

### (B) Empyema

(2) Most common cause of acute empyema is pneumonia and the most common infection is by pneumococcus.

(3) Allison's groups of empyema (Med. Ann. 1939)

(1) Simple Etio Pneumococcus

Path Lung expansile

Clinic (a) Pleuritic pain } simultaneous  
(b) Febrile attack }

Treat Drainage

(2) Complicated Etio Streptococcus

Path Lung unexpansile

Clinic (a) Febrile attack

↓ (b) Pleuritic pain

Treat Thoracic collapse.

(4) Main clinical groups of empyema

(i) Respiratory disease

- (2) General toxemia
  - (a) Active
  - (b) Passive
- (3) Local chest wall suppuration.
- (5) Main danger of syn-pneumonic empyema is exhaustion.
- (6) Main principles in the treatment of acute empyema
  - (1) Avoidance of open pneumothorax in early stages
  - (2) Prevention of chronicity by sterilisation and obliteration of the cavity
  - (3) Raising of general resistance.
- (7) Main methods of treatment of acute empyema
  - (1) Aspiration
    - (a) Young age
    - (b) Early stage with thin pus
    - (c) Extensive cases with bad condition
  - (2) Intercostal drain
    - (a) Acute condition in children
    - (b) Failure of aspirations
  - (3) Rib resection
    - (a) Adults
    - (b) Failure of aspirations
    - (c) Stabilisation of condition.
- (8) In empyema, from treatment point of view it is most important to decide the consistency of pus
  - (1) Thin pus repeated aspirations
  - (2) Thick pus evacuate at once and freely
- (9) In acute empyema
  - (1) Bad, extensive, early cases
 

Treat
 
    - (a) Aspirations
    - ↓ (b) Closed drainage
  - (2) Local cases with stabilisation of general condition and failure of closed drainage
 

Treat Rib resection with open drainage.
- (10) In acute empyema
  - (a) Syn pneumonic
    - (1) Repeated aspirations
    - ↓ (2) Intercostal closed drainage
    - ↓ (3) Costal closed drainage
    - ↓ (4) Costal open drainage
  - (b) Meta pneumonic
    - (1) Costal closed drainage
    - ↓ (2) Costal open drainage
- (11) No case of empyema should be operated upon in syn pneumonic stage. Delay well into the meta pneumonic stage, employing aspirations in the waiting period.
- (12) Small localised empyemata respond to aspiration treatment but if the quantity of pus does not diminish appreciably after five punctures a rib resection is indicated. If the state of the patient does not permit of repeated aspirations or if the pus is so thick that it cannot be aspirated an intercostal cannula drainage

should be instituted and when the general condition has improved rib resection should be carried out. In large diffuse empyemata treatment should start as aspiration, but as soon as conditions are opportune a rib resection should be done.

- (13) During formative period of empyema, aspiration or closed intercostal drainage is the treatment but when definite localisation has taken place, whichever preliminary method is employed should be replaced at the appropriate moment by rib resection and drainage.
- (14) Interval between the onset of streptococcal pneumonia and the development of frank pus is from 2 to 3 weeks and on an average four aspirations are required.
- (15) Take care of lung in every case of aspiration of any pleural effusion.
- (16) Closed inter-costal drainage is the choice in
  - (a) All early acute cases
  - (b) All severe and extensive cases
  - (c) Infants.
- (17) If a specimen of pus is left in a test tube and a sediment of three quarters of its volume remains after 24 hours, the pleura should be drained.
- (18) *Thoracotomy should be delayed until the aspirating needle withdraws frank thick pus nine-tenths of which becomes solid after standing overnight.*
- (19) When the organism present is a pneumococcus, thick pus must be present for a week before drainage is undertaken. When the organism is streptococcus thick pus must be present for at least ten days.
- (20) Thoracotomy should not be carried out until
  - (a) Effusion is localised
  - (b) Mediastinum is fixed

Aspiration should be the first line of treatment in early cases while thoracotomy should be reserved for cases in which aspirations have failed.

- (21) In children the most successful method of treatment is by rib-resection performed immediately after localisation of the empyema has been achieved by repeated aspirations.
  - (22) If empyema pus is foetid on diagnostic aspiration
- Causes
- (1) Gangrene or abscess lung
  - (2) Communication with abdominal viscera
  - (3) Anaerobic infection

Treat Immediate operative drainage

- (23) Immediate operative drainage is also indicated in infected traumatic hæmothorax.

- (24) In resection of a rib for empyema drainage, choose not the lowest true rib but one just clear of the scapula with arm at the side.
- (25) A pleural empyema must be gradually decompressed.
- (26) Special methods in the after treatment of empyema
  - (a) Closed drainage
    - (a) Simple
    - (b) Suction
  - (b) Pleural irrigations.
- (27) Closed drainage is used for about 14 days when open drainage is substituted unless X Ray shows non expansion of the lung
- (28) Empyema can be said to have healed only when visceral and parietal pleurae are in close apposition obliterating the whole of the cavity permanently
- (29) Factors in mortality
  - (a) Virulence of preceding pneumonia
  - (b) Age
  - (c) General condition.
- (30) Success or failure of any form of treatment of empyema in children depends upon the age. Younger the child worse the prognosis.
- (31) In infants empyema is especially fatal in older children and young adults mortality falls rising again in older people.
- (32) Chief causes of chronic empyema
  - (1) Delayed diagnosis
  - (2) Inadequate treatment
  - (3) Nature of infection.
- (33) Rigidity and thickness of the walls of an empyema cavity vary directly with its chronicity and ultimately may be the cause of its persistence.
- (34) One of the principal complications of chronic empyema is pus or air embolism.
- (35) All operation for chronic empyema must be multi staged
  - (1) Thorough exploration
    - ↓ Removal of offending cause
    - ↓ Drainage (a) Simple open
    - (b) With irrigations
  - ↓ (2) Closure of the cavity
    - (A) Operations on the lung
      - (a) Decortication
      - (b) Discussion

## (B) Operations on thoracic wall · Thoracoplasty

- (1) Total      { (α) Brauer  
                  { (β) Sauerbruch  
                  { (γ) Wilms.
- (2) Partial     { (α) Estlander  
                  { (β) Schede.

- (36) Indication for plastic chest operations for chronic empyema  
Arrest in the progress of diminution of empyema cavity
- (37) If there is a persistent sinus in chronic empyema  
(a) Examine the discharge ? Tuberculosis  
(b) Squirt in methylene blue and examine the expectoration ? Pleuro-bronchial fistula.
- (38) Any form of open drainage of an uninfected tuberculous empyema is the worst possible treatment. Either aspirate or institute closed intercostal drainage.
- (39) Gauvain's fluid
- |                   |       |      |
|-------------------|-------|------|
| Guaiacol          | gms.  | II   |
| Iodoform          | gms.  | V    |
| Ether             | gms.  | \    |
| Sterile olive oil | c.ca. | 100. |
-

## CHAPTER IV

# THE MEDIASTINUM AND THE CHEST

### (I) MEDIASTINUM

#### (1) MEDIASTINITIS

Def Cellulitis of the mediastinal cellular tissues

##### (A) ACUTE MEDIASTINITIS

Etio (1) Post-operative

(2) Post-septic

- Causes (A) Cervical (a) Cellulitis  
(b) Thyroiditis  
(c) Oesophagitis  
(d) Retropharyngitis  
(B) Chest (a) Broncho-pneumonia  
(b) Empyema  
(c) Pericarditis  
(d) Oesophagitis  
(C) Mediastinal lymphadenitis

Sites (A) Anterior mediastinitis

(B) Posterior mediastinitis

Clinic (1) Acute general toxæmia

(2) Intrathoracic pressure

(a) Vessels oedema and visible veins

(b) Nerves pain

(c) Trachea dyspnoea

(d) Oesophagus dysphagia

(3) Pointing abscess:

(a) Suprasternal notch

(b) Posterior triangle neck

(c) Intercostal space

(d) Viscera

(4) X-Ray

Comp (1) General toxæmia

(2) Pressure complications

(3) Rupture complications

Treat (1) General antiseptic sulphouamide

(2) Treat the primary focus

(3) Drainage if abscess

##### (B) CHRONIC INDURATIVE SYPHILITIC MEDIASTINITIS

Etio Syphilis

Path (1) Diffuse indurative

(2) Local gumma

Clinic (a) Slowly progressive pressure signs

(b) Presence of syphilitic stigmata

(c) Reaction to treatment

Treat Antisyphilitic



(C) **Chondroma** Sternum, rib, spine

(C) **Gangliosarcoma**

Site: **Children**

Site: **Sympathetic cord**

(C) **Enlarged nerve-fibrous**

Path: (1) **Compression of the cord**

(2) **Interfering pressure**

Clinic: (1) **Spinal signs** (a) **Rect pain**  
(b) **Paralysis**

+ (2) **Intrathoracic pressure signs**

(F) **Lymph gland tumours**

(a) **Hodgkin**

(b) **Lympho-sarcoma**

(c) **Secondary carcinoma**

Primary in: (a) **Breast**  
(b) **Oesophagus**  
(c) **Trachea and lung**

(G) **Intrathoracic goitre**

Path: **Cystic colloid adenoma**

Clinic: (1) **Retrosternal dullness**

(2) **Pressure syndrome**

(a) **Trachea** cough, dyspnoea, stridor

(b) **Vessels** enlarged veins, oedema, cyanosis

(c) **Nerves** recurrent laryngeal paralysis

(d) **Oesophagus** dysphagia (rare)

(H) **Thymus:**

(1) **Enlarged thymus**

Causes: (a) **Status thymo-lymphaticus**

(b) **Rickets**

(c) **Toxic goitre**

(d) **Leukemia**

(e) **Addison's disease**

(f) **Myasthenia gravis**

(2) **Cysts: Hygroma**

(3) **Tumours:** (a) **Malignant thymoma**

(a) **Lymphadenoma**

(b) **Lympho-sarcoma**

(c) **Spindle-celled sarcoma**

(b) **Thymic carcinoma**

(c) **Perithelioma**

*Clinical features of mediastinal growths*

(1) **Retrosternal dullness**

(2) **Pressure syndrome**

(a) **Trachea** Dyspnoea, cough stridor

(b) **Oesophagus** Dysphagia

(c) **Vessels** Prominent veins, oedema, cyanosis



## (C) T B. MEDIASTINAL LYMPHADENITIS

Etio (1) Primary (a) Cervical gland tuberculosis  
                                  ↓ (b) Mediastinal extension

(2) **Secondary** To phthisis

Path (1) 1 B. gland  
↓ (2) Perilymphadenitis → matting  
↓ (3) **Calcification**

↓ (3) **Calcification**

or (4) **Causation**

↓ (5) **Cold abscess**

↓ (6) T B sinus    Sternal or inter-costal

or (7) Rupture into pleura tuberculous empyema

**Clinic (1) X Ray Calcification**

or (2) **Parasternal cold abscess or sinus**

or (3) **Pressure syndrome**

**Hyperplastic tuberculous**

Diff diag (1) Mediastinal tumours

(2) T B bone

(3) Other causes of glandular enlargement

(a) Hodgkin

(b) Malignancy

## ❑ MEDIASTINAL CYSTS

Class	(A) Dermoid cysts	Epidermal
-------	-------------------	-----------

Source	(a)	Inclusion
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(b) Cervical intraepithelial neoplasia

(B) Teratomatous cysts: (a) Mesodermal

(b) **Endodermal**

**Source** Primitive germ cells

(C) Tracheo bronchial cyst

Source Tracheo-bronchial tube

**Clinic (1) Pressure symptoms:**

(e) Dyspnoea, cough and pain

(A) Prominent veins, ardens

☐ X rays

Compl. (1) Pressure

(a) **Vasculature** prominent veins, edema

(d) Respiratory tract dyspnoea cyanosis

(c) *Esophagus dysphagia*

(2) Infection mediastinitis and abscess

(5) **Perforation**

(e) External: slope formation

(b) Internal into neighbouring organs

(4) **Malignancy**

Treat Exclusion

### **D) TUMOURS OF THE MEDIASTINUM**

(A) *Lipoma*

(B) Fibrosis

- (C) Chondroma: Sternum, rib, spine  
 (D) Ganglioneuroma  
 Etio Children  
 Site Sympathetic cord  
 (E) Hourglass neuro-fibroma  
 Path (1) Compression of the cord  
 (2) Intrathoracic pressure  
 Clinic (1) Spinal signs (a) Root pains  
 (b) Paralysis  
 + (2) Intrathoracic pressure signs  
 (F) Lymph gland tumours  
 (a) Hodgkin  
 (b) Lympho-sarcoma  
 (c) Secondary carcinoma  
 Primaries in (a) Breast  
 (b) Oesophagus  
 (c) Bronchus and lung  
 (G) Intrathoracic goitre  
 Path Cystic colloid adenoma  
 Clinic (1) Retrosternal dullness  
 (2) Pressure syndrome  
 (a) Trachea cough, dyspnoea, stridor  
 (b) Vessels enlarged veins, oedema, cyanosis  
 (c) Nerves recurrent laryngeal paralysis  
 (d) Oesophagus dysphagia (rare)  
 (H) Thymus:  
 (1) Enlarged thymus  
 Causes (a) Status thymo-lymphaticus  
 (b) Rickets  
 (c) Toxic goitre  
 (d) Leukemia  
 (e) Addison's disease  
 (f) Myasthenia gravis  
 (2) Cysts Hygroma  
 (3) Tumours: (a) Malignant thymoma  
 (a) Lymphadenoma  
 (b) Lympho-sarcoma  
 (c) Spindle-celled sarcoma  
 (b) Thymic carcinoma  
 (c) Perithelioma

*Clinical features of mediastinal growths*

- (1) Retrosternal dullness  
 (2) Pressure syndrome  
 (a) Trachea Dyspnoea, cough stridor  
 (b) Oesophagus: Dysphagia  
 (c) Vessels Prominent veins, oedema, cyanosis

(d) Lymphatics Chylothorax  
Chylous ascitis

(e) Nerves

Recurrent laryngeal nerve intercostal nerves

Treat (1) Surgical excision  
(2) Radium  
(3) Deep X Rays

#### (4) MEDIASTINAL EMPHYSEMA

Def Presence of gas in the cellular tissues of the mediastinum

Cause Communication with (a) Air passages  
(b) Outside atmosphere  
(c) Pneumothorax

Due to (a) Trauma  
(b) Operations tracheotomy  
(c) Perforations respiratory tract  
oesophagus

Clinic (1) Pressure syndrome  
(2) Crepitant feel  
(3) Tympanitic resonance

Treat Suprasternal incision and suction-aspiration

### (II) INTRATHORACIC TUMOURS

#### Classification

##### (A) Benign :

- (a) Chest wall : (1) Chondroma } of a rib  
                          (2) Osteoma }  
                          (3) Endothelioma of pleura
- (b) Mediastinum : (1) Dermoid cyst  
                          (2) Lipoma  
                          (3) Fibroma  
                          (4) Ganglioneuroma  
                          (5) Neurofibroma hourglass  
                          (6) Thymoma  
                          (7) Restrosternal goitre
- (c) Bronchi and lungs (1) Bronchial fibroma  
                          (2) Congenital cystic disease  
                          (3) Hydatid cyst

##### (B) Malignant

- (1) Primary :
- (a) Chest wall (1) Sarcoma chondro-sarcoma  
                          (2) Endothelioma of pleura
- (b) Mediastinum (1) Teratoma  
                          (2) Lympho-sarcoma  
                          (3) Lymphadenoma
- (c) Bronchi and lung (1) Carcinoma  
                                  (α) Central  
                                  (β) Peripheral  
                          (2) Sarcoma

- Types (1) Local  
 (2) Local with neighbouring changes  
     (a) Collapse lung  
     (b) Bronchiectasis  
 (3) Scattered pleural endothelioma

(2) Secondary :

(a) Chest wall

Primary breast

- Clinic (1) Nodular form  
 (2) Miliary carcinosis  
 (3) Infiltrative type

(b) Mediastinum

- Primaryes (1) Breast  
 (2) Oesophagus  
 (3) Thyroid  
 (4) Bronchi and lungs  
 Path (1) Secondary glands  
 (2) Malignant infiltration

(c) Lungs

- Primaryes (1) Sarcoma  
 (2) Malignant melanoma  
 (3) Carcinoma

*Diagnostic methods in intrathoracic tumours*

- (1) X-Rays: (a) Plain  
 (b) Lipiodol  
 (c) After pneumothorax

(2) Sputum examination

(3) Pleural aspiration

(4) Bronchoscopy

Compl Pressure syndrome

- Treat (A) Innocent removal  
 (B) Malignant (a) Early removal  
 (b) Radiotherapy

### (III) OPERATIONS ON THORAX

*Methods for preventing collapse of the lung during operation*

- (1) Mechanical fixation of the lung  
     By adhesions between lung & pleura  
     (a) Natural in sepsis  
     (b) Stitching parietal pleura to the lung  
 (2) Grasp and traction on the lung towards the wound  
     (a) Manual  
     (b) Instrumental  
 (3) Compression of the chest and abdomen  
     With guarding of the thoracic wound

## (4) Intratracheal insufflation under pressure

## (1) OPERATIONS FOR INJURIES TO THE CHEST

## (A) Traumatic hæemothorax

(1) Recent and small leave alone

(2) Recent and large

Aspiration with oxygen replacement

(3) Massive or recurrent (a) Thoracotomy  
↓ (b) Evacuation  
↓ (c) Closure

## (B) Penetrating wounds of the chest :

Ind Every penetrating wound of the chest below the level of the fifth rib should be explored as it may involve diaphragm and upper abdominal viscera.

Tech (1) Thoracotomy

Excision of 5 of any of the fifth to eighth ribs

↓ (2) Thoracic exploration and treatment

↓ (3) Suture of the diaphragmatic rent

↓ (4) Abdominal extension of the wound

↓ (5) Abdominal exploration and treatment

## (C) Gunshot wounds of the chest

Ind (1) Hæmorrhage : (a) External  
(b) Internal

(2) Large hæemothorax

(3) Large pneumothorax

(4) Abdomino-thoracic wound

(5) Compound fracture of ribs

Contraind (1) Collapse and shock

(2) Collapse of opposite lung

Tech (1) Excision of parietal wound

(2) Thoracotomy rib resection

(3) Exploration

(a) Respiratory viscera

(b) Circulatory viscera

(c) Diaphragm

(d) Abdominal viscera

(e) Parietes

(4) Treatment of foci (a) Removal of F B s

(b) Suture of rents

(c) Evacuation of clots

(5) Suture and closure

## (2) PARACENTESIS THORACIS

## (A) Simple paraentesis

Ind (1) Diagnosis } of pleural effusions  
(2) Treatment }

- With** (a) **Doubtful diagnosis**  
 (b) **Pressure syndrome**  
       (a) Orthopnea or dyspnea  
       (b) Cardiac irregularity  
 (c) **General toxæmia**  
 (d) **Massive effusions**  
 (e) **Empyema**

- Site** (a) **Most dependant spot**  
       (a) Clinical centre of maximum dullness  
       (b) X rays  
 (b) 6th inter space in post. axillary line  
 (c) 8th or 9th inter space in scapular line

- Tech** (1) **Keep stimulants ready**  
 (2) **Local anæsthesia** 1% novocain  
 (3) **Avoid** (a) A rib  
               (b) Entry of air in pleural cavity  
               (c) Injury to the lung  
               (d) Angular movements of the needle  
 (4) **Create vacuum in the syringe after piercing the subcutaneous tissues but before entering the pleural cavity**  
 (5) **Fluid not to be evacuated**  
       (a) **Rapidly**  
       (b) **Completely**  
 (6) **Preserve the fluid for laboratory examination**  
 (7) **Withdraw the needle rapidly**  
 (8) **Seal the puncture of entry**  
 (9) **Observe the patient's condition throughout**

- Compl** (1) **Pleural syncope**  
 (2) **Shock**  
 (3) **Hæmorrhage**  
 (4) **Injury to viscera** Lung heart  
 (5) **Embolism**  
 (6) **Edema of the lung**  
 (7) **Cough**

**(B) Paracentesis with oxygen replacement**

**Ind** **Massive pleural effusions**

- With** (a) **Mobile mediastinum**  
 (b) **Marked pressure syndrome**  
 (c) **Irritative signs**  
 (d) **Maintenance of lung collapse advisable**

- Tech** (1) **Aspiration needle as in (A)**  
 + (2) **Pneumothorax needle well above**  
       (a) **Aspirate from below**  
 + (b) **Introduce oxygen 200 c.ca. from above**  
       **When cough or distress appears**

**(B) EXTENSIVE THORACOPLASTY**

**Ind** (1) Unilateral pulmonary tuberculosis:  
With failure of pneumothorax

(2) Empyema

(3) Bronchiectasis

**Contraind** (A) General condition

(a) Extreme age

(b) General debility

(c) Circulatory or renal inefficiency

(B) Lung condition

(a) Bilateral exudative phthisis

(b) Diseased contralateral lung

(a) Broncho-pneumonia

(β) Bronchiectasis

(γ) Empyema

(C) Tuberculosis elsewhere

(a) Laryngeal

(b) Abdominal

(c) Renal

**Techniques:** (1) **Brauer** Total decostalisation

Removal of entire lengths of 2nd to 11th ribs

(2) **Wilms** Bilateral mobilisation

(a) First stage Paravertebral or posterior

Excision of 2 cms. to 8 cms. of paravertebral portions of 1st to 11th ribs through an incision at the outer border of erector spinae from 6 C. to 11 D.

(b) Second stage Costosternal or anterior

Excision of costal cartilages 1st to 7th, through an incision along the sternal border

(3) **Sauerbruch:**

Paravertebral rib mobilisation

**Def** Two-stage paravertebral extra pleural sub-periosteal resection of 3 to 11 cms. of paravertebral portions of 1st to 11th ribs

**Anaesth:** Local with general

**Position** Lying on the sound side

+ Raised head and shoulders

+ Arms held up and forwards

**Tech** (a) Incisions

(2) Upper 6th cervical vertebra

↓ Paravertebral

↓ Inferior scapular angle

↓ Mid axillary line

(β) Lower Spine of the scapula

↓ Paravertebral

↓ 11th rib

- (b) Division of extracostal muscles
- (c) Retraction of scapula
- (d) Novocainisation of intercostal nerves
- (e) Stripping of periosteum
- (f) Paravertebral excision of ribs
  - (a) 2 of first
  - (β) 4 of second and eleventh
  - (γ) 6 of all others
- (g) Closure with 72 hours drain
- (h) Firm strapping
- (4) **Maurer Modified Sauerbruch**  
Paravertebral mobilisation of ribs by excision of transverse processes of vertebrae

#### *Operative difficulties of thoracoplasty*

- (1) Injury to intercostal artery
- (2) Injury to parietal pleura

#### *Post-operative treatment of thoracoplasty*

- (1) Elastic strapping with firm binder → belt
- (2) Sling to the upper extremity
- (3) Drainage
- (4) Stimulant expectorants

#### *Post-operative complications of thoracoplasty*

- (1) Shock and collapse
- (2) Cardiac failure
- (3) Reaction
- (4) Exacerbation of underlying disease
- (5) Suppuration
- (6) Lung complications
  - (a) Tuberculosis
    - (a) Exacerbation in same lung
    - (β) Aspiration in other lung
  - (b) Inflammatory
    - (a) Bronchitis
    - (β) Broncho-pneumonia
    - (γ) Aspiration pneumonia
  - (c) Atelectasis
- (7) Cardiac displacement
- (8) Mobile displaced mediastinum
- (9) Deformity Scoliosis
- (10) Paralysis of abdominal muscles

#### (5) **EXTRAPLEURAL PNEUMOLYSIS**

**Def** Localised compression of the lung by stripping parietal pleura off the chest wall over a diseased area and packing some substance in the extrapleural cavity

**Ind** (See under Lung)

**Anaesth** Local infiltration

**Tech** (A) Anterior approach



- (a) Transverse subclavicular incision
- (b) Sub-periosteal excision of anterior end of 2nd or 3rd rib
- (c) Incision of posterior periosteum
- (d) Stripping off of the parietal pleura by gloved finger
- (e) Introduction into the cavity thus made, of
  - (a) Paraffin wax at 45°-50°C.  
(Sterilised by heating for one hour at 150°C.)
  - (b) Muscle graft
  - (c) Fat graft
- (B) Posterior approach
  - (a) Paravertebral incision
  - (b) Exposure and excision of the third rib between scapular border and spinous process
  - (c) } Same as in (A)
  - (d) }
  - (e) }

- Post. compl (1) Trauma to the lung  
 (2) Rupture of a tuberculous cavity  
               Abandon the operation  
 (3) Pressure ulceration  
 (4) Infection → sinuses

#### (7) INTRA PLEURAL PNEUMOLYSIS Thoracotomy

Def: Division of pleural adhesions complicating pneumothorax

Tech (1) Closed Jacobson

- (a) Insertion of a thoracoscope through a cannula introduced into the pleural cavity through a neighbouring inter-space
- ↓ (b) Introduction of an electric cautery through another inter-space
- ↓ (c) Cautery division of pleural adhesions under thoracoscopic guidance

(2) Open:

- (a) Local anaesthesia
- (b) Incision:
  - (1) Anterior resection of 1.5 of 2nd rib
  - (2) Posterior resection of 2" of 4th or 5th rib
- (c) Division of pleura round the adhesion  
       : By knife or cautery

- Compl (1) Effusion (a) Serous  
                       (b) Haemorrhagic  
                       (c) Purulent
- (2) Pleuro-bronchial fistula

#### (8) BRONCHOTOMY

Tech Reflection of an osteoplastic flap of dorsal ends of 5th, 6th, 7th and 8th ribs

#### (9) BRONCHO-CUTANEOUS FISTULAE

- (A) Conservative (a) Paint with 35% silver nitrate  
                       (b) Paint with 85% alcohol  
                       (c) Cauterisation

- (B) Operative (a) Isolation and excision of the tract  
 ↓ (b) Pack the cavity with pedunculated muscle-graft

# (10) PNEUMOTOMY

- Ind (1) Exploration of lung for trauma one stage  
 (2) Drainage of lung abscess two stage  
 (3) Lobectomy

- Principles (1) Exact preoperative localisation (a) Clinical  
 (b) X ray

- (2) Two stage operation  
 (a) Adhesions between the pleurae  
 ↓ (b) Removal of the parietal wall of abscess

## Tech (A) First stage

Position Semi-sitting

Anaesth Local infiltration

Site Dependant over the abscess

- Steps (a) Resection of 3 of two ribs  
 With inter-costal tissues  
 (b) Pack of iodine gauze over the parietal pleura  
 (c) Temporary closure

## (B) Second stage

- (a) Open out the wound  
 (b) Exploration by syringe  
 (c) Protection of the surroundings  
 (d) Excision of the lung tissue forming the  
 parietal wall of the abscess  
 (e) Large drainage tube

- Post compl (1) Shock  
 (2) Haemorrhage  
 (3) Pneumothorax and emphysema  
 (4) Collapse of the lung  
 (5) Pneumonia  
 (6) Empyema  
 (7) Infection of the chest wall  
 (8) Broncho-cutaneous fistula

# (11) LOBECTOMY

- Ind (1) Unilateral bronchiectasis  
 (2) Local bronchial carcinoma  
 (Pneumonectomy is more radical)  
 (3) Chronic lung abscess

## Tech (A) One stage

Ind Pleural adhesions already present

Anaesth Positive pressure intratracheal

Position Lying on the sound side

- Steps (1) Major inter-costal thoracotomy  
 7th space

- (2) Crush the phrenic (lower lobe)
- (3) Division of (a) Pleural adhesions  
(b) Pulmonary ligament
- (4) Separation along inter lobar fissure
- (5) Two tourniquets around the pedicle
- (6) Pleural pack
- (7) Division of pedicle
- (8) Closure of pedicle  
Three rows of No. 1 chromicised catgut  
on round needle
- (9) Burying the pedicle
- (10) Test for leakage
- (11) Drainage  
Resection of 9th rib in mid-axillary line

#### (B) Multi-staged

Ind Pleural adhesions absent

Tech (1) After plombage

(2) After pleural adhesions by gauze packs

(3) Cartery pneumosectomy Graham

(a) Posterior thoracotomy  
+ Pleural packing or suture

↓ (b) Cauterisation of the lobe in recurrent sittings

(4) Deferance lobectomy Whittemore

(5) Pedicle dissection lobectomy Rienhoff

(a) First stage

(a) Isolation and ligation of pulm. art.

+ (3) Ligation of main bronchus

(b) Second stage after 10 days

Pneumonectomy

### (IV) OPERATIONS ON MEDIASTINUM

#### (1) POSTERIOR EXTRA PLEURAL APPROACH

Ind (1) Mediastinal abscess

(2) Mediastinal tumour

(3) Exposure of oesophagus

Tech (1) Incision Vertical 1 lateral to vertebral spines

(2) Division of extracostal muscles

(3) Excision of (a) 3" of posterior ends of 4 ribs

(b) Tips of transverse processes

(4) Ligation and division of intercostal bundles medially and  
of posterior periosteum above and below

(5) Stripping of parietal pleura

#### (2) ANTERIOR APPROACH

(A) Anterior intercostal approach Transpleural

Ind: Excision of dermoid

- Tech (1) Incision (a) Mid-axillary to mid-sternum along a rib  
 ↓ Resection of the rib  
 or (b) Osteoplastic flap of 2nd to 4th rib  
 (2) Opening of pleural cavity  
 (3) Spreading of the ribs after resection of costal cartilages  
 (B) Milton's sternum-splitting approach Extrapleural  
 Ind Retrosternal goitre  
 Tech (1) Incision (a) Cervical collar  
 + (b) Vertical midline  
 (2) Exposure of the sternum  
 (3) Midline drilling opposite 3rd interspace  
 or (4) Introduction of bone shear from upper side  
 (5) Transverse → vertical splitting and retraction  
 (6) Treatment of focus  
 (7) Closure by wiring  
 (C) Cervical approach  
 Ind (1) Retrosternal goitre urgent decompression  
 (2) Surgical emphysema  
 Tech Incision transverse supra sternal

## (V) IMPORTANT POINTS

### (A) Trauma

- (1) Indications for operation for thoracic trauma
  - (1) Haemorrhage external
  - (2) Haemothorax massive or recurrent
  - (3) Penetrating wound below 5th rib ? visceral injury
  - (4) Gunshot wounds.
- (2) Strapping for fracture rib must start and end beyond the midline of the body and must be applied in full expiration.

### (B) Empyema

- (3) Aspiration treatment in acute empyema
  - (1) Diagnosis
  - (2) Children
  - (3) Thin exudate
  - (4) Bad toxemia
  - (5) Synpneumonic
  - (6) Early stages
  - (7) Massive effusion with pressure
  - (8) Mobile mediastinum
  - (9) Bilateral
- (4) Advantages of closed suction drain
  - (1) Re-expansion of lung
  - (2) Good drainage
  - (3) Prevention of secondary infection.

- (5) Treatment of empyema in a nutshell
  - (1) Aspiration
  - (2) Intercostal drainage
  - (3) Costal drainage.
- (6) Methods of drainage in empyema
  - (1) Closed (a) Simple  
(b) Suction
  - (2) Open.
- (7) Most common cause of acute empyema pneumonia.
- (8) Most common cause of insidious empyema tuberculosis.
- (9) Chronic empyema
  - (1) Failure of thoracotomy for acute empyema to heal within 2 months
  - (2) Empyema necessitatis
  - (3) General cachexia with respiratory trouble.
- (10) Treatment of chronic empyema
  - (1) Simple free drainage
  - ↓ (2) Dakin's pleural wash-outs
  - ↓ (3) Decortication
  - ↓ (4) Thoracoplasty

### (C) Lung suppuration

- (11) Treatment of lung suppuration
  - (1) Expectorants and antiseptic inhalations
  - (2) Postural drainage
  - (3) Bronchoscopic drainage
  - (4) Pneumothorax
  - (5) Phrenic avulsion
  - (6) Thoracoplasty
  - (7) Pneumotomy and drainage
  - (8) Lobectomy
- (12) Lung abscess is most common after operations on oral and pharyngeal cavities (Tonsillectomy).
- (13) Treatment of bronchiectasis
  - (1) Early stage medical postural bronchoscopic
  - (2) Unilateral  
Multistaged paravertebral extrapleural thoracoplasty
  - (3) Advanced stage Lobectomy

### (D) Atelectasis and embolism

- (14) Prevent collapse of the lung during operation by :
  - (1) Guarding the thoracotomy wound
  - (2) Traction on lung
  - (3) Positive pressure anaesthesia.
- (15) Measures for lung expansion :
  - (1) CO<sub>2</sub> inhalations

- (2) Deep breathing exercises
- (3) Suction drain
- (16) Clinical aspects of pulmonary embolism
  - (1) Immediate death
  - (2) Acute cardiac and lung crisis → death
  - (3) Pneumonia (infarction).
- (E) Phthisis
  - (17) Chronic fibroid or productive phthisis is good for surgery
    - (a) Artificial pneumothorax
    - (b) Phrenic avulsion
    - (c) Pneumolysis
      - (α) Intrapleural
      - (β) Extrapleural
    - (d) Thoracoplasty
      - (α) Sauerbruch
      - (β) Wilms
      - (γ) Brauer
  - (18) Contraindications for operative treatment in phthisis
    - (1) Active progressive disease in opposite lung
    - (2) Do not operate if trachea is in midline.
- (F) Tumours
  - (19) Common intrathoracic tumours which are operable
    - (1) Retrosternal goitre
    - (2) Mediastinal dermoid
    - (3) Primary carcinoma
    - (4) Hydatid cyst.
  - (20) Diagnostic methods in intrathoracic tumours:
    - (1) Clinical examination:
      - (a) Pressure syndrome
      - (b) Consolidation signs
    - (2) X Rays:
      - (a) Plain
      - (b) Lipiodol
      - (c) After lung collapse by pneumothorax
    - (3) Sputum examination
    - (4) Pleural fluid
    - (5) Bronchoscopy
  - (21) Mediastinal tumours cause symptoms early due to pressure. Tumours of lung and pleura are comparatively silent.
  - (22) The most common intrathoracic neoplasm is secondary carcinoma
    - (a) Lymph glands
    - (b) Lungs
    - (c) Pleura.
  - (23) Do not forget to examine all bones for secondaries in bronchial carcinoma.
  - (24) Secondary carcinoma in lung contraindicates surgery



- (a) Lymphadenoma
- (b) Lymphatic leukaemia
- (c) Lympho-sarcoma.

## (I) Operations

- (34) Major intercostal thoracotomy  
Whole of 4th 5th or 6th interspace with posterior mobilisation of upper and lower one or two ribs.
- (35) Phrenicotomy  
Tech (a) Radical phrenicotomy of Goertze  
(b) Phrenicus exsiccation of Felix  
(c) Simple crushing.  
Ind (1) Independent basal or diaphragmatic lesions  
(2) Adjunct or preliminary to (a) Pneumothorax  
(b) Thoracoplasty
- (36) Common sites for paracentesis thoracis  
(1) Centre of maximum dullness  
(2) X Ray  
(3) 6th interspace in posterior axillary line  
(4) 8th or 9th interspace in scapular line.
- (37) Chief indications for thoracoplasty  
(a) Chronic empyema  
(b) Unilateral phthisis  
(c) Unilateral bronchiectasis  
+ (d) Other lung practically healthy  
} Failure of conservative treatment for four months.
- (38) Thoracoplasty  
(A) Regional decostalisation (a) Estlander  
(b) Schede  
(c) Roberts.  
(B) Extensive or total  
(a) Brauer total  
(b) Wilms both ends  
(c) Sauerbruch paravertebral  
(d) Maurer transverse processes.
- (39) Forms of paravertebral thoracoplasty of sauerbruch  
(A) Total paravertebral 1st to 11th rib  
(a) Single stage  
(b) Two stage  
(B) Partial paravertebral  
(a) Sub-total paravertebral 1st to 8th rib  
(b) Upper lobe 1st to 6th rib  
(c) Apical whole of 1st and 2nd rib.
- (40) Most important part of thoracoplasty is wedge excision of the first rib, as close to the transverse process as possible, without injury to subclavian vessels and brachial plexus.



- (41) Injection of intercostal nerves with novocain is recommended in every extensive thoracic operation to minimise the shock.
  - (42) For extensive removal of the ribs, cut them in the middle and remove anterior and posterior portions separately by fracturing them at the costal cartilages and rib angles respectively
  - (43) The most frequent post-operative complication after thoracoplasty is atelectasis, which depends upon the retention of bronchial secretion due to the reduced expectorative ability of the affected side.
  - (44) Some points in thoracoplasty
    - (a) Avoid too extensive resection of ribs
    - (b) Avoid preliminary phrenocotomy
    - (c) Be careful of mobile mediastinum
    - (d) Choose the right time.
  - (45) Chief problems of lobectomy
    - (1) Infection of pleural cavity
    - (2) Leakage from the stump
    - (3) Mediastinal infection and emphysema.
  - (46) Role of pleural adhesions in lobectomy
    - (a) Pleural adhesions present one stage
    - (b) Pleural adhesions absent two stage
      - (a) Pleural approximation
      - ↓ (β) Lobectomy
-

## CHAPTER V

# SURGERY OF THE DIAPHRAGM

### THE DIAPHRAGM

#### (I) CONGENITAL MALFORMATIONS

##### (1) Absence

- (A) Complete (a) Bilateral  
(b) Unilateral

With Intrathoracic prolapse of abdominal organs

##### (B) Muscular element

With Complete diaphragmatic hernia

- ##### (2) Incomplete fusion :
- (a) Anterior
  - (b) Posterior
  - (c) Central

##### (3) Eventratio diaphragmatica

- (a) Fibrous degeneration of muscle
- + (b) Invagination into the thorax

#### (II) TRAUMA

##### (1) Rupture

- Etio (a) Buffer accidents  
(b) Sudden rise in intra-abdominal pressure

##### (2) Wounds

- Etio (a) Stab wounds lower thorax  
upper abdomen  
(b) Gun shot wounds

Clinic (A) General shock and hæmorrhage

##### (B) Local

- (1) Open prolapse of abdominal viscera in the chest wound
- (2) Closed tension pneumothorax

Compl (1) Hæmorrhage

##### (2) Associated visceral injury

- (a) Spleen and liver
- (b) Alimentary canal

- (3) Infection (a) Thoracic empyema  
(b) Abdominal peritonitis

Treat Exploration

##### (A) Thoracic

- Ind (a) Trauma via thorax  
(b) Associated trauma to thoracic viscera

(B) Marwedel

(C) Abdominal

Ind (a) Trauma via abdomen

(b) Associated trauma to abdominal viscera

## (III) DIAPHRAGMATIC HERNIA

Def A breach in the continuity of diaphragm followed by  
*invasion of the thorax by abdominal viscera*

Etiol Age (a) Children

(b) Over 50

Sex Females

Factors (a) Congenital under-development

(b) Trauma and its sequelae

(c) Paralysis phrenic interruption

+ (d) Intermittent high abdominal pressure

(a) Adiposity

(β) Constipation

(γ) Pregnancies

Path. class (A) Eppinger's classification

(1) *Hernia vera*

(a) Congenita

(b) Traumatica

(c) Foraminalis or hiatus

(a) Parasternalis sterno-costal

(β) Bochdaleki lumbo-costal

(γ) Para-oesophageal

(δ) Nervi sympathetici

(d) Para-oesophageal:

Types (a) Short oesophagus type congenital

(β) Para-oesophageal type acquired

(γ) Gastro-oesophageal type acquired

(2) *Hernia spuria*:

(a) Congenita

(b) Traumatica

(3) *Eventratio diaphragmatica*:

(a) Diffusa

(b) Circumscripta

(B) Hume's classification

(1) Domal

(2) Para-oesophageal

(3) Absence of half of the diaphragm

(4) Pleuro-peritoneal canal

(5) Vascular foraminal

Path (1) Paralysis and atrophy of diaphragmatic musculature with paradoxical movements

- (2) Presence of abdominal viscera in chest pressing on and displacing the thoracic organs

- Clinic (A) **Symptoms**
- (1) **Abdominal**
    - (a) Dysphagia
    - (b) Dyspepsia
  - (2) **Thoracic**
    - (a) Respiratory
    - (b) Cardiac
  - (3) **General**
    - (a) Neurasthenia
    - (b) Anaemia
- (a) Dyspepsia related to food and posture  
 (b) Paroxysmal cyanosis and cough  
 (c) Cardiac embarrassment
- (B) **Signs**
- (1) Thoracic tympanitis
  - (2) Cardiac displacement
  - (3) X Rays
    - (a) Erect
    - (b) Prone
    - (c) Trendelenburg

- Diff. diag
- (1) Esophageal lesions
  - (2) Stomach lesions : ulcer or carcinoma
  - (3) Surgical dyspepsia : cholecystitis
  - (4) Respiratory lesions
    - (a) lung disease
    - (b) pneumothorax
  - (5) Cardiac lesions
  - (6) Diaphragmatic lesions : subdiaphragmatic abscess
  - (7) Acute abdomen (in strangulation)

- Compl.
- (1) Incarceration }
  - ↓ (2) Strangulation }
- Clinic
- (a) Acute intestinal obstruction
  - + (b) History of triple disturbances
    - (a) Respiratory
    - + (β) Cardiac
    - + (γ) Digestive

- Diff. diag
- (1) Acute abdomen
  - (2) Acute respiratory disease

- Treat
- (1) Radical operation : pleuro abdominal
  - (2) Short circuit → radical operation  
In bad cases
  - (3) Palliative phrenicectomy

- Treat
- (1) Small hernia with no symptoms  
Leave alone
  - (2) Moderate hernia with mild symptoms
    - (a) Regulation of diet
    - (b) Reduction of weight



- (3) Sub-diaphragmatic abscess
  - (4) Spleen
  - (5) Pancreas
  - (6) Colon
  - (7) Paravertebral adenopathy
  - (8) Upper peritonitis
  - (9) Ileus
- (4) Toxic
- (a) Uræmia
  - (b) Peritonitic toxæmia
  - (c) Epidemic
- (5) Post-operative
- (A) Operations on lower thorax
  - (B) Operations on upper abdomen
  - (C) Operations on toxæmic patients
    - (a) Peritonitis
    - (b) Uræmia

Most common operations followed by hiccup

- (1) Stomach and duodenum
- (2) Biliary apparatus
- (3) Spleen
- (4) Pancreas
- (5) Colon
- (6) Urinary organs    kidney  
                              bladder  
                              prostate

### Compl Exhaustion

**Treat (A) Treat the etiology**

(B) Treat the hircough

- (1) Mental Distraction
- (2) Position Fowler
- (3) Sedative Bromides → Morphia
- (4) Respiratory Holding the breath  
Co<sub>2</sub> inhalations  
Nitroglycerine
- (5) Digestive Carminatives  
Stomach sedatives  
Stomach wash
- (6) Reflex Epigastric counter irritation  
Ether 1 c.c. intramuscular
- (7) Phrenicotomy (α) Alcohol injection  
(β) Crush

*Special drugs for hiccough*

- (1) Saturated sol. of menthol in rect. spirit  
10 min. every hour
- (2) 1 in 1000 adrenaline  
10 min. in teaspoonful water every hour
- (3) Benzyl benzoate 20% in alcohol  
20 min. in water or milk

**(V) IMPORTANT POINTS**

- (1) Stab wound below the 5th interspace with painful breathing  
Wound of the diaphragm explore.
  - (2) In every case of stab wound of the diaphragm explore its neighbours, especially on the abdominal side.
  - (3) Etiology of diaphragmatic hernia
    - (a) Congenital
    - (b) Trauma and its sequelae
    - (c) Paralysis.
  - (4) Diaphragmatic hernia is a masquerader of the upper abdomen as it closely simulates upper abdominal lesions.
  - (5) Paroxysmal cyanosis and cough are an invariable accompaniment of congenital diaphragmatic hernia.
  - (6) Diaphragmatic hernia has triad symptom-complex  
Respiratory + Cardiac + Digestive.
  - (7) Crushing of the phrenic nerve is a very useful adjunct for operations on diaphragm.
-

## CHAPTER VI

# SURGERY OF THE HEART AND THE PERICARDIUM

## THE HEART

### (I) CONGENITAL AFFECTIONS

Patent ductus arteriosus

Etiol: Average age 24 years

Path: Communication between right and left auricles

↓ Arterio-venous communication

Compl (a) Cardiac decompensation

(b) Bacterial endocarditis

Treat: (a) Conservative

(b) Exposure and ligature

### (II) TRAUMA

Varieties (1) Stab wounds

(2) Gun shot wounds

(3) Travelling needles

Sites Left ventricle → right ventricle → auricle

Clinic (1) External wound

With external haemorrhage

Near the sternal edge

Between 2nd and 6th costal cartilages

↓ (2) Free interval Latent period

↓ (3) Heart tamponade

(a) Shock

(b) Internal haemorrhage signs

(c) Prominent veins

(d) Muffled cardiac sounds

(e) Increased heart area

↓ (4) Progressive fall in blood pressure

(5) X Rays (a) Increased heart area

(b) Stationary or weak heart

Compl (A) Immediate (1) Shock

(2) Haemorrhage

(a) External

(b) Internal

(3) Heart tamponade

(B) Late (1) Pericarditis → pyopericardium

(2) Pleurisy → empyema

(3) Pneumonitis

(4) Sub-phrenic abscess

(5) Peritonitis



- Treat**
- (1) No tamponade or hæmothorax  
Conservative expectant treatment
  - (2) Tamponade responding to conservatism :  
Aspiration
  - (3) Tamponade not responding to conservatism  
Operation
  - (4) Penetrating wound with
 

(a)	Ext. hæmorrhage
(b)	Tamponade
(c)	Hæmothorax
- ? Operate

### (III) CORONARY CARDIOPATHIES

- Varieties**
- (A) Coronary thrombosis
  - (B) Congestive heart failure
  - (C) Angina pectoris
- Etiæ**
- Surgical operations**
- Factors**
- (a) Shock
  - (b) Dehydration
  - (c) Infection
  - (d) Tachycardia
- Path**
- (A) Transient or partial occlusion due to spasm  
Angina pectoris
  - (B) Complete permanent occlusion of
    - (a) Main coronary artery :  
Cardiac failure
    - (b) Branch of coronary artery
      - (a) Cardiac failure
      - (b) Ischæmic infarction
      - (c) Disturbed cardiac rhythm
- Progress**
- (1) Spasmodic coronary occlusion / angina
  - ↓ (2) Partial organic sclerosis / coronary arteritis
  - ↓ (3) Total coronary occlusion / coronary thrombosis
- The fate of the heart muscle depends on
- (a) Degree of occlusion
  - (b) Size of occluded vessel
  - (c) Efficiency of collateral circulation

#### *Heart in coronary disturbances*

- (1) Disturbances of rhythm or rate
- (2) Claudication / angina pectoris
- (3) Cardiac infarcts
- (4) Cardiac aneurysm
- (5) Spontaneous cardiac rupture
- (6) Myocardial degenerative fibrosis
- (7) Cardiac failure

- Clinic** (1) Shock  
 (2) Respiratory crisis dyspnoea cyanosis  
 (3) Cardiac crisis tachycardia, irregular heart  
 (4) Angina pectoris
- Diff. diag** (1) Acute respiratory conditions  
 (2) Acute abdominal conditions  
 (3) Other causes of shock and collapse.
- Treat** (A) **Angina pectoris and cardiac pains**  
 Ind Successful paravertebral novocain block  
 Tech (1) **Paravertebral alcohol injections**  
 Upper five thoracic ganglia and their rami  
 (2) **Stellatectomy** Left or both  
 (3) **Resection of upper thoracic ganglia**
- Post. compl** (a) Failure  
 (b) Inter-costal neuritis  
 (c) Pleurodynia  
 (d) Pneumothorax
- (B) **Early congestive failure of the heart**  
**Treat** **Total thyroidectomy**  
**Contraind** (a) No response to conservatism  
 (b) Advanced cases with pulmonary congestion  
 (c) Coronary thrombosis with angina  
 (d) Syphilitic aortitis and arterio-sclerosis  
 (e) Low basal metabolic rate  
**Compl** (1) Recurrent laryngeal trauma  
 (2) Parathyroid trauma
- After treat** (1) Rest for four weeks  
 (2) Regulation of body activity  
 (3) Thyroid medication  
 Balance between (a) Myxoedema  
 & (β) Decompenation
- (C) **Coronary thrombosis and occlusion**  
 Ind Improvement of myocardial circulation  
 Tech (A) **Beck's muscle graft** Pectoralis to heart  
 (B) **Cardio-omentopexy** Omentum to heart

#### (IV) HEART IN RELATION TO SURGERY

- (1) No type of heart disease, per se is a contra indication to urgent surgery
- (2) Chief danger to heart, in surgery is congestive heart failure
- (3) Pre-operative medical preparation of heart is valuable in indicated cases
- (4) Best clinical guides for heart conditions in surgery are
  - (a) Respiration
  - (b) Pulse

- (c) Blood pressure.
- (d) Other signs of decompensation
- (5) Sudden death during surgical procedures in
  - (a) Obesity with fatty heart
  - (b) Coronary thrombosis
  - (c) Syphilitic aortitis

## (V) CARDIAC AIR EMBOLISM

- Sources
- (1) *Æro-urethroscopy via corpus spongiosum*
  - (2) *Artificial pneumothorax via lung*
  - (3) *Neck operations via torn veins*

- Clinic
- (1) Sudden collapse and shock
  - (2) Respiratory and cardiac crisis
  - (3) *Water wheel splashing on auscultation*

Treat Aspiration of the right ventricle

Site Between 5th and 6th costal cartilages  
Close to the left sternal edge

## (VI) CARDIAC ARREST

Etio General anaesthesia in

- (a) Obesity
- (b) Cardiac debility

Treat (1) Conservative

- (a) Trendelenburg position
- (b) Coramine injection
- (c) Precordial
  - (a) Compression
  - or (β) Hot packs

↓ (2) Intra-cardiac adrenaline or coramine

↓ (3) Massage of the heart Bimanual

Tech (1) Rapid epigastric incision  
↓ Bimanual massage

↓ (4) Direct ventricular compression:

Tech (a) Extend the epigastric incision up  
↓ (b) Free the diaphragmatic attachment  
↓ (c) Compress the ventricle (within the pericardium) 30-40 times per minute

Prognosis Bad

## THE PERICARDIUM

### (I) SUPPURATIVE PERICARDITIS

- Causes
- (1) Direct external infection traumatic
  - (2) Local regional extension
    - (a) Pneumonia
    - (b) Empyema
  - (3) Blood borne septicæmic
  - (4) Secondary infection of pericardial effusion
- Clinic
- (1) Heart tamponade
  - (a) Cardiac distress

(b) Cardiac dullness increased

(c) Quiet heart

(2) General toxemia

Diag (1) X Ray

(2) Pericardial puncture (dangerous)

Site 5th left interspace one inch from left sternal margin

Treat Pericardiostomy

## (II) CHRONIC ADHESIVE PERICARDITIS

Syn Pick's disease

Cause (1) Tuberculosis

(2) Suppurative

(3) Traumatic

(4) Extension from pleura or mediastinum

(5) ? Rheumatism

Path Adhesions:

(A) Single or partial adhesions

(B) Diffuse adhesive pericarditis

(1) Centrifugal Mediastino-pericarditis

Path (a) Adhesions of pericardium to external structures

↓ (b) Interference with systole

Clinic Partial local symptoms and signs

Treat (1) Precordial costo-chondrectomy of Bräuer

(2) Phrenicotomy

(2) Centripetal Constrictive pericarditis

Path (a) Adhesions of pericardium to heart

↓ (b) Interference with diastole

↓ (a) Pulmonary venous stasis

+ (c) Systemic venous stasis

+ (γ) Progressive heart failure

Clinic Venous stasis Pick's syndrome

(1) Edema and cyanosis of face and chest

(2) Prominent veins

(3) Enlarged liver with ascitis

(4) Hydrothorax

Diag X-Ray: Pericardial changes

(a) Enlargement

(b) Fixation

(c) Distortion

(d) Calcification (Do not operate)

Comp Heart failure

Treat (1) Conservative and Pre-operative:

Rest low salt diet limited fluids evacnants

(2) Operative

(A) Removal of adhesions

(B) Pericardiectomy

(a) Partial

(b) Total

## ATIONS ON THE HEART AND PERICARDIUM

### OPERATIONS ON THE PERICARDIUM

#### 1) Pericardial paracentesis :

- Ind (a) Pericarditis with effusion  
(b) Suppurative pericarditis  
(c) Heart tamponade

5th Local novocain 1%

- ites (a) Angle between xiphisternum and costal margin  
(b) Left 5th inter space, 1 from left sternal margin

ion Up + Back + Out (slight)

pth 2.5 inches from the skin

ech Maintain suction all the time

- mpl (a) Injury to the heart  
(b) Pleurisy → empyema

#### 2) Pericardiotomy

(A) Trans-chondral: 5th and 6th costal cartilages

- (1) Local novocain infiltration
- (2) Resection of 5th and 6th costal cartilages  
With inter-costal bundle
- (3) Ligature of int. mam. artery
- (4) Division of triangularis sterni
- (5) Vertical incision in the pericardium

(B) Trans-sternal Sternal trephine

Adv No interference with (a) Int. mam. artery  
(b) Pleura

Tech Trephine the sternum just above the xiphoid

(C) Costo-xiphoid

Tech Incision over the left costo-xiphoid angle

#### (3) Pericardiostomy : Drainage of pericardial sac

(a) Pericardiotomy (See above)

↓ (b) Suture of the parietal pericardium to deep fascia

↓ (c) Closed drainage

#### (4) Pericardiectomy and cardiolysis

- Ind Adhesions (a) Pericardium to chest wall  
(b) Heart to pericardium

(A) Cardiolytic or Precordial costo-chondrectomy of Brauer ;

Def Decostalisation of heart

Ind : Centrifugal mediastino-pericarditis

Tech (1) Musculo-cutaneous flap

(2) Sub-periosteal resection of

(a) 2nd to 7th costal cartilages

(b) One inch of 4th and 5th ribs

(c) Left lateral half of the sternum

**(B) Pericardiectomy Deforme**

Def Removal of anterior parietal pericardium

Tech: (1) Resection of 4th, 5th and 6th costal cartilages  
With intercostal bundles

(2) Resection of left two-thirds of the sternum

(3) Retraction of pleura

(4) Isolation and excision of thickened parietal pericardium

**(II) OPERATIONS ON THE HEART****(1) Exposure of the heart****(A) Trans-sternal**

Def Abdomino-thoracic route of Duval Barasty

Tech (1) Incision midline  
level of 2nd rib to umbilicus  
(2) Longitudinal midline split of sternum  
(3) Wide retraction**(B) Para sternal****(1) Spangaro Intercosto-chondrectomy**Tech (a) — incision left 5th interspace  
(b) Division of costal cartilages above and  
below at their sternal attachments  
(c) Retraction**(2) Kocher's quadrilateral flap**(a) External hinge  
(b) Internal hinge

Tech Division of 3rd 4th 5th and 6th cost. cart.

(3) Bilateral parasternal;

Tech Bilateral excision of 3rd, 4th, 5th and 6th costal car-  
tilages and adjacent parts of the sternum

(4) Rib resection Left 3rd, 4th or 5th

(5) Intercostal 4th left interspace

**(2) Cardiac trauma**

Ind Heart tamponade

Pre-oper (1) Anti-shock (without intravenous clays)  
(2) Screening  
(3) Estimation of blood pressureAnæsth (1) Nil if unconscious  
(2) General  
(3) LocalSteps (1) Exposure steps  
(a) Spangaro  
(b) Kocher  
(c) Duval Barasty  
(2) Incision and evacuation of pericardium



## IMPORTANT POINTS

### A) Trauma

- (1) Surest signs of cardiac injury are
  - (1) Enlargement of heart shadow
  - (2) Diminution or absence of heart movements
  - (3) Progressive fall in blood pressure.
- (2) Beck's clinical triad of cardiac tamponade
  - (1) Low arterial pressure
  - (2) High venous pressure
  - (3) Quiet heart.
- (3) Auricular wounds in particular are very liable to produce heart tamponade.
- (4) Results of non-operative treatment of heart wounds are extremely poor compared with those of a well chosen operation (for heart tamponade)
- (5) In heart injuries, every patient who reaches the theatre with the least evidence of cardiac function should be operated upon.
- (6) If the instrument of trauma be in situ, in stab wounds of the heart or near about great arteries, it should not be withdrawn till the patient is under actual operation.

### B) Coronary cardiopathies

- (7) In every case of acute upper abdomen, remember coronary thrombosis.
- (8) Three ways in which heart can be influenced by neuro-surgical attack
  - (a) Vaso-motor
  - (b) Motor or pressor
  - (c) Sensory
- (9) Any sympathectomy sufficiently extensive to be of service must interrupt all these three kinds of cardiac innervation (See 8), though not to an equal degree.
- (10) Although total thyroidectomy relieves distressing anginal attacks and other coronary cardiopathies, its best results are in early congestive failure.
- (11) In congestive failure of the heart, total thyroidectomy changes the state of decompensation to that of compensation within four weeks.
- (12) Best results from total thyroidectomy are obtained in those patients with chronic congestive failure due either to rheumatic or hypertensive processes, who can be restored to compensation when at rest in bed. Those who do not respond to rest in bed and ordinary medical treatment, are likely to derive little benefit from the operation, which is hazardous in them.



- (13) Myxodema only appears when the metabolism is lowered to 30%.
- (14) In coronary sclerosis and myocardial degeneration operation is contra-indicated except in order to save life.

(C) Pericardium :

- (15) Suppurative pericarditis is a common complication of
- Pneumonia
  - Empyema
  - Pyæmia
  - Septicæmia.
- (16) Chief difficulty in the diagnosis of suppurative pericarditis lies in the fact that it is almost invariably secondary to infection elsewhere and there is lack of localising symptoms.
- (17) Repeatedly examine the cardiac area in every septic case to exclude suppurative pericarditis.

(D) Operations

- (18) Main indications for heart surgery
- (1) Trauma

    - Arrest of hæmorrhage
    - Suture of wounds
  - (2) Coronary cardiopathies

    - Angina Sympathectomy
    - Thrombosis
    - Beck's muscle graft
    - Cardio-omentopexy
  - (3) Heart failure

Total thyroidectomy
  - (3) Pericardium

    - Pyopericardium Pericardiostomy
    - Pericardial adhesions Pericardiectomy
  - (4) Cardiac restoration

Bimanual massage
  - (5) Pulmonary embolism

Trendelenburg
- (19) Heart exposure routes
- (1) Trans-sternal

Daal Barastý abdomino-thoracic
  - (2) Para sternal

    - Spangaro intercosto-chondrectomy
    - Kocher quadrilateral flap
    - Bilateral parasternal
    - Rib resection
    - Intercostal.
- (20) The danger of paracentesis pericardii is greater than that of an exploratory pericardiotomy and so paracentesis pericardii should be banished from surgical practice.
- If drainage of triangle of lower and left 5th and 6th pericardium are based on vascular area behind the adjacent parts

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